MAN-MADE AURORA OVER THE OCEAN

Nakamura, Shigehisa

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OVER

THE OCEAN

SHIGEHISA NAKAMURA

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PREFACE

This work concerns to a problem on the course of the natural process on the planet earth in the solar system. It is hard to consider any processes found on the earth except considering the planet earth under the influence of the solar effects.

The classical dynamics is essential to consider the processes on the earth are controlled by the sun. Mathematics has been contributive to develop a path of theoretical understanding of the processes appearing on the earth.

The author feels it necessary to write dare here that the key of "relativity" and "quantum mechanics" was obtained by the pioneers on the bases of the knowledge on "classic dynamics.

The earth surface is covered by the water as the ocean. One third of the earth surface is the land surface, and the rest is the ocean part. The human activity has be developed on the earth surface, nevertheless, we have to aware of that there have been left many problems to be solved on the earth.

In this work, the author intended to introduce a key to promote the problems for obtaining an advanced knowledge in the next step to the future.

The contents in this work is consisted by several notes written in a very brief form, so that some part might be easy to see what are written but the other some parts might be hard to see what is the purpose of the author.

The author knows that this work is not complete in a scope of modern science, nevertheless he has to feel it to write them down to declare what the author has had considered on his way to promote his scientific work. He believes that the knowledge of our scientific research work is advancing now. We have to start to get the key for advancing to the future science.

Unfortunately, the author has only a limited knowledge on physics which has been developed by many scientists by this time as seen in a historical review of the related research works.

Hence, the author here introduces his expect for you obtaining a key to the next step of science at this stage.

The author has had ever given several keys for geophysics, i.e., meteorology, ocean sciences, geomagnetism, seismology, geology, and the related fields in science.

This work is only for obtaining a key to the next step of science.

Now, the author wishes that all of the advanced science as fruits should be helpful for the human activity and human welfare in the next step.

Lastly, the author has to notice that this work is a part of the research project started in Kyoto University during his stay time in the campus. The author has continued his work successively as a part of the extensive research work in relation to the project.

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LUNAR SHADOW AT SOLAR ECLIPSE

Shigehisa Nakamura
Kyoto University, Japan

Abstract— This an introduction to a satellite monitoring of the lunar shadow tracking on the earth surface at the predicted solar eclipse. One of the specific events is the one on 22 July 2009 in the low latitude zone of the western Pacific. A brief notice is given in relation of the solar eclipse on the planet earth in a scope of geophysical science.

1. INTRODUCTION

This is an introduction to a satellite monitoring of the lunar shadow tracking on the earth surface at the predicted solar eclipse. This is a part of the extensive research work at the Shirahama Oceanographic Observatory, Kyoto University. The project was started in 1960. For this project an offshore fixed tower was settled in the northwestern Pacific after one of the project leaders, Professor Shoitiro Hayami of Geophysics, in Kyoto University. Professor Hayami had ever been a member of the observation group for a solar eclipse on an island, Losop Island, in the north western Pacific in an early year around 1930.

In advance of the 50years Anniversary of "the Shirahama Oceanographic Tower", we had a chance for the satellite monitoring of the solar eclipse. This is the first time of the satellite monitoring of the predicted solar eclipse on the earth surface.

On 22 July 2009, the solar eclipse track passed just neighbor of the Japanese Islands. This solar eclipse might be a tiny impact to "the geophysical processes on the earth" now.

After reviewing the history of human activity on the earth, we can aware that the processes on the planet earth have been governed in the solar system.

Essentially, research on the "Solar Eclipse" has been promoted in the fields related to the section of "Astronomy". Hence, it should be raised as an interdisciplinary research on the solar activity in relation to the global processes on the earth.

The author here introduces a notice to the solar eclipse observed on the earth after his idea for a satellite monitoring of a solar eclipse in a scope of his interests.

2. SATELLITE MONITORING

In this work, the author introduces first some note to the lunar shadow on the earth surface at the solar eclipse. As a special reference, the event of the solar eclipse on the date of 22 July 2009 is taken for his convenience. The reference data was obtained by the satellite GMS-2 which has been operated on a synchronized orbital motion with the earth at the height of 800km just above the earth's surface on the equator.

The satellite GMS-2 is operated for the purpose of monitoring the various geophysical processes on the earth. A sensor mounted on the satellite has a function to send us about the information of the various geophysical processes including the radiations out of the earth radiation. The author concentrated his interest in this work to the data of the earth surface pattern monitored as a passive signal in the visible band of the solar radiation reflected on the earth surface and of the earth radiation out of the earth surface.

As for the temperature, it is described in an accuracy of 0.5 degree C. The author has a wish to have the interested date in a form of an accuracy of 0.1 degree C In order to have a more detailed pattern as a reduced result from the satellite monitoring data.

By this time, the author has worked to see what satellite thermal pattern on the ocean surface or the land surface could be obtained in the infrared band of the radiation out of the ocean surface or the land surface.

The data of the satellite GMS-2 is successively processed and distributed through the Web-site by the Japanese Meteorological Agency as the service for public and citizen uses.

The resolution of a pixel size in an imagery of the earth surface pattern is about 4km square. Nevertheless, we have to be aware of some restriction at utilizing the data obtained by the satellite GMS-2. Some part of the data should be strictly processed after the exactly assured reference of the data.

3. PREDEICTED SOLAR ECLIPSE

Each one of the solar eclipses is predicted properly by the National Astronimical Observatory, Tokyo to issue every year in the series of the annual publication as the "Chronological Scientific Tables", which is available for the public and citizen use as well as the scientists in the related fields to the astronomy and geophysics. The edition No.82 of this Table is for 2009.

In Figure 1, an illustration of the lunar shadow zone on the earth surface at the event on 22 July 2009 is introduced in a modified form of the original 2009 issue of the National Astronomical Observatory.

Main shadow zone is shown along an expected line track. Shadow zones at the start and at the end of the solar eclipse are also shown by the distorted circle as a projection of the main and sub shadow zones covering the interested zones.

As for the main solar eclipse shadow, the astronomical prediction about the solar eclipse on 22 July 2009 could be specified by the factors related to the main shadow, that is to say, to indicate the location and time of the solar eclipse shadow. After the evaluation by the National Astronomical Observatory, the specifying data set is given as follow;

	Time (JST)	Location
Start of partial ecliptic shadow	2009 July 22/ 08h 58.3m	84 43' E/ 19 03'N
Start of main ecliptic shadow	2009 July 22/ 09h 52.8m	70 31' E/ 20 21'N
Meridional Center (Concentric)	2009 July 22/ 11h 33.0m	143 22'E/ 24 37'N
End of main eclipse shadow	2009 July 22/ 13h 17.8m	157 41'W/ 12 55'S
End of partial ecliptic shadow	2009 July 22/ 14h 12.4m	171 51'W/ 14 14'S

At the time of the meridional center, a bright ring of the solar beam is formed by the fringe (4%) of the sun.

4. TRACKING OF SOLAR ECLIPTIC SHADOW

A data set for the solar eclipse shadow on the earth surface was issued as a special data set through the Web-site by the Japanese Meteorolgical Agency.

The data set consist the northern hemisphere as a synthesized foot print of the monitoring sensor of the satellite GMS-2 to demonstrate the movement of the solar ecliptic shadow pattern in a step of 15min from the time of 0900-JST to 1400-JST. The data is simply distributed the solar ecliptic shadow pattern reduced after processing the signal radiation for the visible band which was monitored by the sensor mounted on the satellite GMS-2.

The solar ecliptic shadow pattern could be seen along a path projected on the earth following the factors shown above to specify the solar eclipse event. Nevertheless, the cloud distribution was the contaminating factor at seeing the solar ecliptic shadow.

With the author's experience of the daily pattern of the earth surface, especially, of the ocean surface, the author found that the shadow pattern reduced after processing the earth radiation of the visual band is coarsely consistent to the astronomical prediction.

It was unfortunate this time that no data was supplied for the reduced pattern in the infrared band. So that, it is expected what thermal pattern was obtained in the shadow zone at the interested solar eclipse event to the details in the successive work.

5. CONCLUSIONS

A satellite monitored solar eclipse shadow on the earth was introduced. This time, the available data was the radiation in the infrared band reflected on the earth surface and radiated out of the earth surface. The data was obtained by the satellite GMS-2.

The astronomical prediction of the solar eclipse on 22 July 2009 was consistent to the reduced result after processing the data of the satellite monitoring of the radiation in the visible band.

It should be encouraged to promote a research on the thermal pattern at an event of the predicted solar eclipse by a satellite monitoring of the solar eclipse.

Referring to the data obtained and monitored by the satellite, the special and timely pattern of an interested solar eclipse shadow can be seen to help for realizing a more detailed knowledge of an environmental and the other geophysical processes instead of the limited numbers of the discrete local observations obtained on the earth surface in the past.

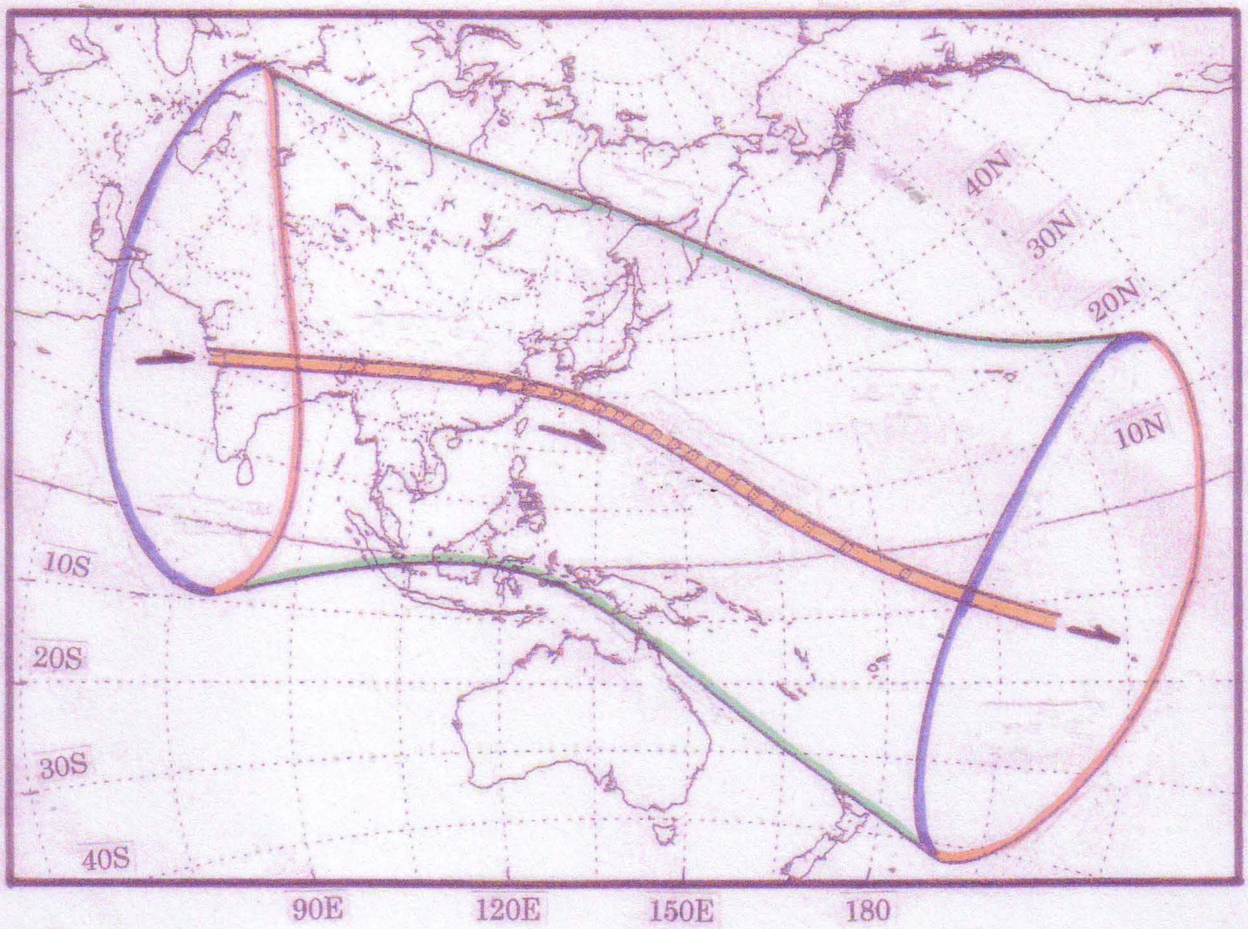

Figure 1 Solar eclipse shadow belt on the earth surface
On 2009 July 22.
(Refer to the National Astronomical Observatory)

1. Orange color line for the main shadow belt zone
2. Red color line at each case of the west and east parts for the start of the solar eclipse at sun rise and at sun set
3. Blue color line at each case of the west and east parts For the end of the solar eclipse at sun rise and at sun set
4. Green color lines for the northern and southern limits of the sub-shadow belt centering the main shadow zone
5. Arrows (in black color mark) shows the shadow movement with the time elapse.

A MODEL OF THE 11 YEAR SOLAR CYCLE

Shigehisa Nakamura
Kyoto University, Japan

Abstract—This is a note concerning a significant trend of the 11 year cycle in the solar activity. The monitored solar cycle for about 100 years has been studied by the scientists in order to develop a numerical model for the solar cycle in a scope of dynamical electromagnetism. This solar cycle model could be a key to an answer at considering any one of the geophysical processes on the planet earth.

1. INTRODUCTION

This is a note to help a significant trend of the 11 year cycle in the solar activity. The monitored solar cycle for about 100 years is studied by an approximated model in order to understand a specific property of solar activity in a scope of dynamical electromagnetism. Chapman[1, 2] and Stix[3], for example, noted the early state of the researches related to the solar cycle and solar activity specified by the sun spots number index in an annual time unit. This solar cycle model could be a key to an answer at considering any one of the geophysical processes on the earth as a planet in the solar system.

2. MAXWELL EQUATIONS

In order to start for studying solar cycle, Maxwell equations are introduced first for the magnetic field B, the electric field E, and the electric current density j, i.e.,

$$\mathrm{div}\, B = 0\,, \qquad \text{(1)}$$

$$\mathrm{curl}\, B = \mu\, j\,, \qquad \text{(2)}$$

$$\mathrm{curl}\, E = -(\partial / \partial t) B\,, \qquad \text{(3)}$$

where, the mark μ is the magnetic permeability (for free space, in this case). In equation of (2), an approximation is assumed for non-relativistic, or slow phenomena (neglected the displacement current).

When the field is in a material with electric conductivity σ, the current is σ times the electric field (known as Ohm's law). When the material is in motion, it is taken into account of that the law valid in the co-moving frame of reference (i.e.,$j = \sigma E$). In a case of motion (say, v for $v \ll c$), transformation to the frame at rest is as $j = j$ and $E = E + v \mathrm{x} B$. Then, $J = \sigma (E + v \mathrm{x} B)$. Eliminating E and j in the above equations, the induction equation is written as

$$(\partial / \partial t) B = \mathrm{curl}(v \mathrm{x} B) - \mathrm{curl}(\eta\, \mathrm{curl}\, B), \qquad \text{(4)}$$

where, magnetic diffusivity is $\eta = 1/(\mu\ \sigma)$.

3. MEAN-FIELD ELECTRODYNAMICS

The solar cycle could be solved referring essentially to the Maxwell equations for the magnetic field B, the electric field E, and the electric current density j [1]. Then, an induction equation is reduced. Electric conductivity of the sun could be determined as that of the ionized gas (or plasma) following to Spitzer(1962). For the case of the dynamo problem in terms of a mean magnetic field, $B=[B]+b$, where $[B]$ may be understood as an average over longitude or, more generally, as an ensemble average. Then, $[b]=0$. In a same way, $v=[v]+u$. Substituting these two into the induction equation, fluctuating part is obtained after separating the mean part.

Following Moffatt(1978) with some assumptions, the mean part $[B]$ and the fluctuating part b can be separately described, i.e.,

$$(\partial / \partial t)[C] = \mathrm{curl}([v]\mathrm{x}[B]+\varepsilon - \eta\, \mathrm{curl}[B]), \quad \text{......}(5)$$

$$(\partial / \partial t)b = \mathrm{curl}([v]\mathrm{x}b+u\mathrm{x}[B])+G-\eta\, \mathrm{curl}\, b), \quad \text{......}(6)$$

where, $\varepsilon = [u\mathrm{x}b]$, and $G= u\mathrm{x}B-[u\mathrm{x}b]$.

Under some specific condition, the value of ε is shown as following, i.e.,

$$\varepsilon = \alpha [B] - \beta\, \mathrm{curl}[B]+\ldots , \quad \text{......}(7)$$

where,

$$\alpha = -(1/3) \int_0^{\infty} [u(t)\, \mathrm{curl}\, u(t-t')]\mathrm{d}t' , \text{ and } \beta = (1/3) \int_0^{\infty} [u(t)\, u(t-t')]\mathrm{d}t' , \quad \text{......}(8)$$

One of the way to describe feature of the mean-field induction eqution is the term involving α (that is called as the α effect).

Following to Knause (1967), $\alpha \simeq +1\Omega$ (or -1Ω) is the mean angular velocity of the Sun. The sign of α depends on helicity of the flow in the solar convection.

Stix(1976) has shown the meridional cross sections for contours of constant toroidal field strength and poloidal lines of force (cf. Figure 1). The arrows are indicating strength and sign of polar field. An illustration is given in an adjusted time scale for 11 years for each half-cycle.

Theoretical butterfly diagram (contours of constant toroidal field) in an oscillatory kinematic $\alpha\, \Omega$ dynamo is shown by Steenbeck and Krause in 1969 (cf. Figure 2).

The numerical results noted above is obtained under several assumption with some conditions, so that specific patterns could be demonstrated on the bases of the dynamical theory in an approximated forms as introduced by Stix [1].

The author here has to notice that the scientists should have their understanding of the specific pattern in the solar activity at considering the geophysical processes on the planet earth.

4. CHAOTIC DYNAMO

As a dynamic system, the magnetohydrodynamic dynamo is capable of chaotic behaviour. Such can be seen from the numerical integrations mentioned, for example, by Stix [1].

A simplified expression of the model can be written as follow, i.e.,

$$(\partial / \partial t)A = 2DB - A\,, \qquad (9)$$

$$(\partial / \partial t)B = iA - (1/2)i\,\Omega A' \text{-} B\,, \qquad (10)$$

$$(\partial / \partial t)\Omega = \text{-}iAB \text{-} \nu\,\Omega \qquad (11)$$

where, A' is complex conjugate of A.

System (9) to (11) is a complex generalization of a system first studied by Lorenz in 1963 as a model of turbulent convection. The system in this work likes to the Lornz system. It has chaotic solutions but also has solutions which are periodic in time.

5. DISCUSSIONS AND CONCLUSIONS

A theoretical background is introduced in a form of shortened expression. This might be helpful for realizing the monitored solar activity or the 11 year cycle of the sun spots number index. This work might be well related to the various geophysical processes found on the planet earth. Nevertheless, it is yet necessary to consider how complicated processes appear in the earth as well as in the sun.

It should be aware of an advanced research to be promoted even at present for our dynamical understanding of the sun as well as the planet earth where we are living.

REFERENCES

[1] Chapman, S., and J. Bartels 1940 Geomagnetism, Oxford University Press, London, 1049p.
[2] Chapman, S. 1964 Solar plasma, geomagnetism, and aurora, Gordon and Breach, New-York, 141p.
[3] Stix, M. 1989 The Sun-an introduction, Astronomy and Astrophysics Library, Springer-Verlag, 390p.

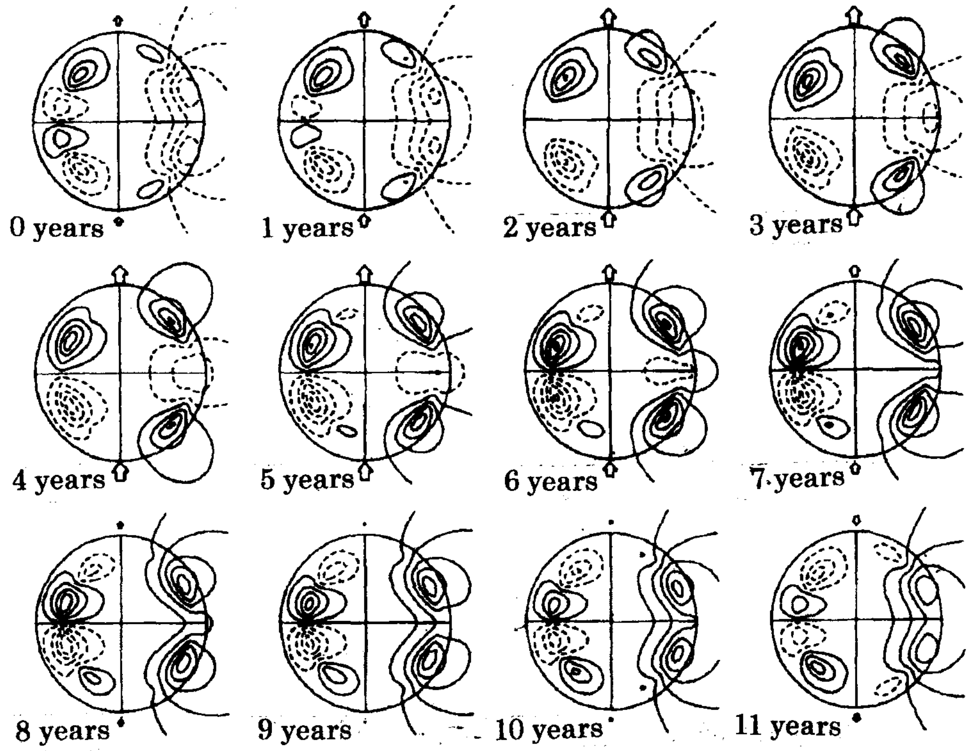

Figure 1 Oscillatory kinematic $\alpha\,\Omega$ dynamo model
In each illustration in every year, the meridional cross section is shown as (1)
(1) on the right-contours of constant toroidal field strength,
(2) on the left-contours of constant poloidal lines of force.
(3) arrows indicate strength and sign of the polar field,
(4) time scale is adjusted to 11 years for each half-cycle.
(5) refer to Stix (1976)

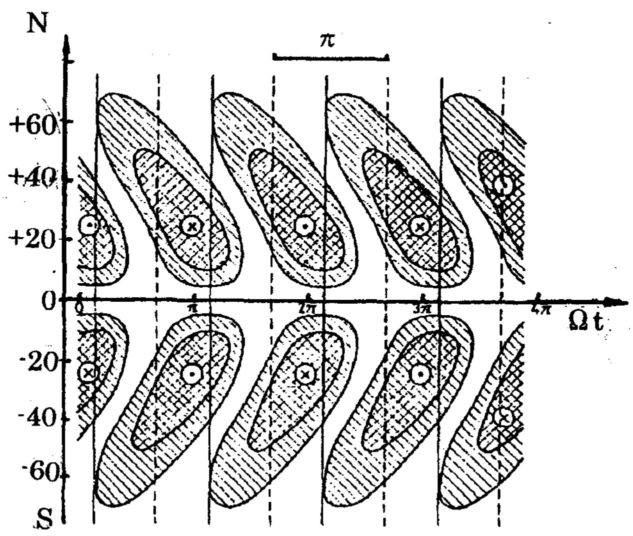

Figure 2 Theoretical butterfly diagram (contours of constant toroidal field) in an oscillatory kinematic $\alpha\,\Omega$ dynamo model
(cf. Steenbeck and Krause, 1969).

THE 11 YEAR SOLAR CYCLE AND SEA SURFACE TEMPERATURE

Shigehisa Nakamura
Kyoto University, Japan

Abstract—This is a brief note to the monitored solar cycle in relation to the sea surface temperature at a station in the ocean. First of all, a short note on the monitored solar cycle as a part of "Astronomy". One of the most classic interests for the scientists is "global magnetism" of the sun just like the main magnetic field of the earth. A note is given to a part of the observed result of sea surface temperature trend fit well to sun spot number index trend introduced in 2009 by the Azores Science group.

1. INTRODUCTION

This is a brief note to the monitored solar cycle in relation to the sea surface temperature at a station in the ocean. First of all, the author introduces a short note on the monitored solar cycle as a part of astronomy. It must be familiar to the scientists what the author notes as a briefing of the astronomical knowledge especially for realizing what should be considered about the relation between the sea surface temperature variations at Azores in the Atlantic Ocean and the sun spot number index variations during the time period of 1960 to 2007. A notice is given whether the fitting trends of the two factors could be possible to extend for the following several ten years.

2. SOLAR CYCLE

A convenient index of the solar cycle is the sun spot relative number, for example, Chapman ever written in his publication in 1964 [1] . As for the two types of "sun spot models", the first one is an empirical one. The second one is the magnetohydrostatic model. These models has been developed, for example, by Stix, 1989[2].

A part of solar cycle variation of sun spots is introduced in a diagram, for example, as found in Figure 1. So-called solar cycle has been well known by the geophysical scientists though its dynamical mechanism has been extensively studied in the fields related to astronomy.

This 11 year cycle was found first by Schwabe in 1844. Hale had the first scientist of the magnetic field in sun spots in 1908. Hale had observed them by 1923 and formulated his polarity rules on his bases of three consecutive cycles. That is to say, Hale's rules are so as that:

(1) the magnetic orientation of leader and follower spots in bipolar groups remains the same in each hemisphere over each 11-year cycle,
(2) the bipolar groups in the two hemispheres have opposite magnetic orientation,
(3) the magnetic orientation of bipolar groups reverses from one cycle to the next.

Chapman[1] and Stix[2] had noted in his publication to a more detailed terms. For example, trends of the solar cycle variation of sun spots, prominences, and faculae. The numbers of northern and southern polar faculae are drawn with a sign in order to indicate the alternating magnetic polarity (which was published by Sheeley in 1964). Stix[1] had given the signs of plus or minus mark magnetic reversals at the poles in 1974.

3. BUTTTERFLY DIAGRAM

Another important result is known as butterfly diagram introduced by Maunder in 1922. The systematic behaviour of bipolar sun spot groups is readily understood in terms of a subsurface mean toroidal magnetic field, which is a field where lines of force are circles around the solar axis [1, 2].

In addition to the mean toroidal field there is a mean poloidal magnetic field. Cowling (1934) stated first the line-of-sight component of the magnetic vector field B. The mean field electrodynamics has been developed since 1955 by Parker and his followers.

4. SEA SURFACE TEMPERATURE

In 2007, the Azores Scientific Group showed that the observed sea surface temperature during the time period of 1960 to 2007 has shown a significant trend to fit the solar cycle variation of sun spots for four consecutive solar cycles. Nevertheless, it is hard to accept what has introduced by the Azores Group for helping to understand any global trend of the sea surface temperature on the planet earth. The scientists for dynamics of the ocean and atmosphere have found already any dynamical processes of the geophysical fluid motions are not so simple to see on a basis of a limited data observed on the earth surface. The Azores Group had a lucky position of their station for obtaining their interesting finding.

5. DISCUSSIONS AND CONCLUSIONS

The author here has to note whether the Azores Scientific Group could show a same trend for their extensive observation of the sea surface temperature in relation to solar spots for about several ten years trends of the two physical factors.

The ocean scientists have learned that the sea surface thermal pattern on the earth is not so simple that it is hard to take it easy to relate the sea surface temperature variations at Azores in the Atlantic Ocean to the sun spots number variations as an index of the solar activity.

The ocean water has a complicated system of the ocean water motion between the earth crust surface and the atmospheric layer under an affect of the solar radiation.

So that, a global understanding of the ocean thermal transferring system should be taken into consideration at discussing on the sea surface temperature variations for obtaining a more reasonable understanding in a physical scope.

Finally, it is expected that a more advanced research should be promoted for a dynamical understanding of the various processes appear on the earth under the effect of the solar radiation.

REFERENCES

[1] Chapman, S. 1964 Solar plasma, geomagnetism, and aurora, Gordon and Breach, New-York, 141p.
[2] Stix, M. 1989 The Sun-An introduction, Springer-Verlag, 390p.

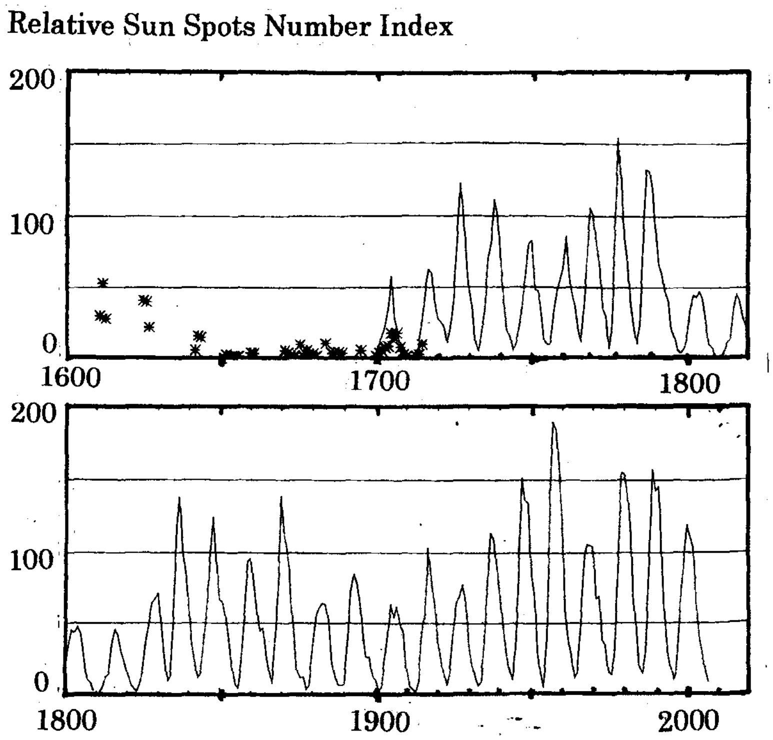

Figure 1 Solar cycle variation of sun spots

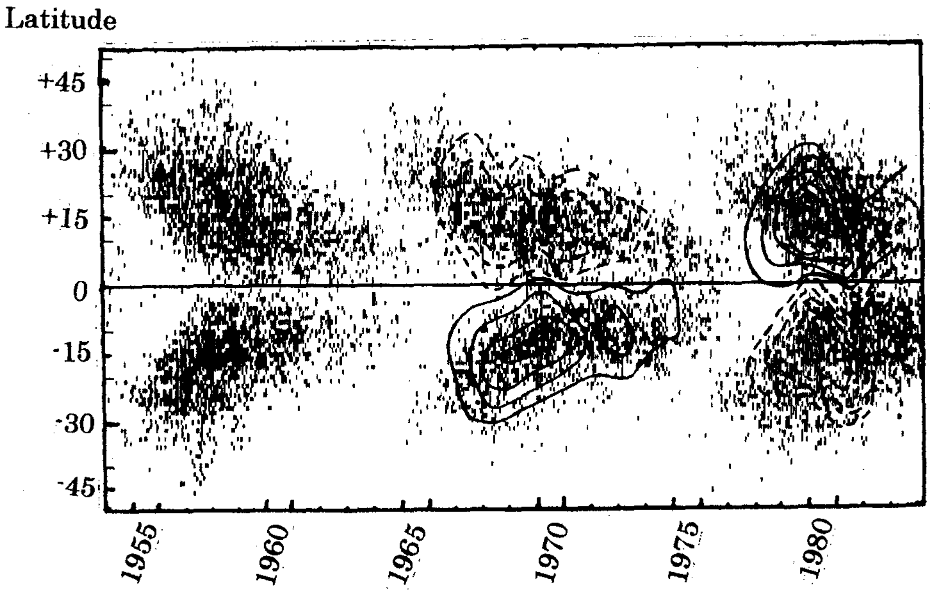

Figure 2 Butterfly diagram from Mt.Wilson Observatory
(courtesy R.Howard, National Solar Observatory)
Note:-(1) contours of radial mean field
(from Mt.Wilson and Stanford magnetograms)
(2) each vertical bar marks a sun spot
(3) the contours are (a) for solid positive 27 μ T, 54 μ T, ...,
(b) for dashed negative -27 μ T, -54 μ T, ...

2. THERMAL DOME

(1) Thermal Dome in the Atmospheric Surface Layer

(2) Thermal Dome on the Ocean Surface

(3) Thermal Dome above the Atmosphere

THERMAL DOME IN THE ATMOSPHERIC SURFACE LAYER

Shigehisa Nakamura
Kyoto University, Japan

Abstract— In order to see specific pattern of the monitored thermal dome formed on the atmospheric layer on the earth, a model is introduced for helping to obtain the pattern of the thermal dome in a form of mathematical expression. The solution is constructed by the interesting factors at determining the shape of the thermal dome envelope. Some note is given to see about the actual pattern found.

1. INTRODUCTION

In order to see specific pattern of the thermal dome found in the atmospheric layer on the earth. For a convenience, a formulation is introduced for a model of the interested thermal dome. A solution is obtained as a result of reduction of the formulated equation under some given conditions. A mathematical technique is convenient at reducing the equation in order to obtain the solution. It can be seen that the several factors are constructing the form of the solution. These factors may specify the thermal dome envelope. In the actual case of the thermal dome, the solution can be taken as a simulated model approximately. Then, the author would give his note for relation between the fact and the model.

2. MODEL OF THERMAL DOME

In order to describe a thermal dome in the atmospheric layer on the earth surface, a model is assumed to be constructed by a formulation of fluid dynamics of atmosphere in the troposphere defined as that between the tropopause and the earth surface.

In the troposphere, vertical distribution of the atmospheric temperature can be described as follows,

$$T(z) = \Gamma z + T_0, \quad \text{.......(1)}$$

Where, $T(z)$ is an equivalent potential temperature at the height z above the earth surface, and $T_0 = T(z=0)$. In the actual atmospheric layer, Γ = 4degreeC per 1000m (for example, Kimura, [1]).

As for a case of heat island in an urban area, Kimura had given a brief note with his model for application to the case in the city area of Tokyo [2].

In this work, a thermal dome is a model. For the author's convenience, a local small area on the earth surface is assumed as a heat source which is the trigger of a thermal dome.

Usually, motion of an air particle in the interested atmospheric layer, can be taken as a resultant of a motion in the mean field and a field of disturbances. It is easily understood what form is the simple expression of the static state of the atmospheric layer. So that, it should be concentrated to the author's interest how to formulate the field of the disturbances which could contributive to see a thermal dome formation. One of the mathematical techniques is to take one of the disturbances as a simplified perturbation. Then, it is simplified the problem in this work to ease a formulation.

3. FORMULATION

Now, a cylindrical coordinate system with the vertical axis (z), a horizontal radial axis (x) and circular angle axis (ϕ) referring to the radial axis is introduced as the reference.

Assume a heat source located at the origin of the cylindrical coordinate system, the thermal dome modeling can be formulated to make ease in a mathematical reduction at obtaining a solution. When the angular motion of the interested air particle in the layer is negligible or not exist, formulated description can be seen in a more simple form. In this case, the expression form can be simplified as follows, i.e.,

$$[u(x, z, \phi ; t), w(x, z, \phi ; t), p(x, z, \phi ; t)]=[u(x, z; t), w(x, z; t), p(x, z; t)]$$

With the consideration noted above, the set of the equation for the interesting model can be written in a non-dimensional form as that shown as follow, i.e.,

$$(\partial u/\partial t) + u(\partial u/\partial x) + w(\partial u/\partial z) = -(1/\rho)(\partial p/\partial x) + \nabla(\nu \nabla u), \quad \text{..............(2)}$$

$$(\partial w/\partial t) + u(\partial w/\partial x)+w(\partial w/\partial z) = -(1/\rho)(\partial p/\partial x) + \alpha gT+ \nabla(\nu \nabla w), \quad \text{......(3)}$$

where the velocity field (u, w), the temperature field T and pressure field p at the location at (x, z) for the desity field ρ in a layer of isotropic air particles with a viscosity constant ν in brief, though the exact expression of κ in a general form must be a tensor.

As for the equation of potential temperature, it can be written as

$$(\partial T/\partial t) + u(\partial T/\partial x) + w(\partial T/\partial z) + w\Gamma = \nabla(\kappa \nabla T), \quad \text{..........................(4)}$$

where the notation κ for diffusion coefficient.

The above equations (2), (3) and (4) form a simultaneous equation system which looks quite similar form for the case of two dimensional problem on heat island or cool island [2]. In this work, a set of approximated linear equations is considered for obtain an asymptotic solution in the atmospheric layer on the earth surface.

The boundary conditions are as follow for convenience, i.e.,

$$u=0,\ w=0, \text{ and } T=T_0 \cos kx, \quad \text{for} \quad z=0, \quad \text{...(5)}$$

and

$$u\rightarrow 0,\ w\rightarrow 0, \text{ and } T\rightarrow 0, \quad \text{for} \quad z\rightarrow\infty \quad \text{...(6)}$$

After rewriting introducing several parameters and applying the Cauchy-Rieman relation to introduce a stream function, the reduced form of the equation is obtained as follows,

$$(\partial^2 T/\partial x^2) + (E_0^2/Pr)(\partial^6 T/\partial z^6) = 0, \quad \text{..(7)}$$

where, $E_0 = \nu^2/(\alpha g\Gamma L^4)$, and $Pr = \nu/\kappa$. When rewriting the above (6) after introducing that $(1/Ra) = (E_0^2/Pr)$ with a consideration of z/δ, then, an order estimation of the thermal dome formation in scale must be expected as that evaluated $\delta^6 = (1/Ra)$ In the equation of the above (7), time factor is implicit under the specific assumptions and conditions.

4. VERTICAL SECTION OF THERMAL DOME

The solution of the equation (7) can be obtained with an assumption of $T = \theta(\eta)\cos kx$ for $\eta = z/\delta$. Now, the equation is rewritten as

$$(d^6\theta / d\eta^6) = k^2\theta \quad \text{...(8)}$$

Substituting $\theta = \exp(\sigma\lambda\eta)$ with $\sigma^6 = k^2$, then, $\lambda^6 = 1$. So that, six eigen values of the equation (8) are expected. The equation (8) have six roots, nevertheless three roots in term of positive real part do not satisfy the boundary condition for $z \to 0$. Then, the solution satisfying the necessary conditions for $z=0$ can be written as

$$\theta = (1/2)\exp(-\sigma\eta) + (1/\sqrt{3})\exp(-\sigma\eta/2)\cos[(\sqrt{3}/2)\sigma\eta - (\pi/6)] \quad \text{.........(9)}$$

The author has now obtained a solution for the interested two dimensional problem in a vertical cross section with the vertical axis passing the origin in the coordinates. Obtained solution tells us that a form of the interested thermal dome is determined by the heat source pattern on the earth surface. An assumption makes it possible to describe the heat source pattern by a mathematical function.

5. GOVERNING AREA OF THERMAL PATTERN

The author has introduced the solution (9) for the thermal dome pattern under several assumptions with some restricts of the given conditions.

Now, it is necessary to give a notice about what is essential at modeling the thermal dome as the two dimensional (2D) problem and the three dimensional (3D) problem even though the solution is apparently expressed in the same form after reducing mathematical process for solving the equation (7).

Under the given assumptions and conditions for the thermal dome in this work, the 3D problem in the cylindrical coordinate system is boldly a problem for a thermal disc. With the assumption of no circular thermal gradient or of no circular motion, the solution is written apparently in a same form of the solution as the function of (x, z),. Nevertheless, the 2D problem (for example, in the case of a heat island [2])

The solution is for the thermal dome area in the 3D problem. The solution for the 3D model should be essentially different from for the 2D model. It can be expressed as that the solution for the 2D model simply gives a segment of a vertical section of the 3D model. Then, the total thermal energy E for temperature potential T concerns to the 3D model should be written as follows when the solution for the 2D segment (thermal energy E') shows the vertical section of the 3D model. Then,

$$E = \oint E'\, d\phi, \quad \text{or,} \quad E = \int_0^{2\pi} E'\, d\phi \text{. ....(10)}$$

6. DISCUSSIONS

The author has a mathematical solution for a thermal dome in the atmospheric layer on the earth surface. This solution suggests a specific structure of the atmospheric convection at the core of the thermal dome in fact. The specific photographs are ever obtained by the optical camera on board of an air craft. Some of these are the examples of an explosive nuclear energy release [3]. An illustration is given in the photographs in Figure 1. Each of the cases in the figures is a shot at an instance of the transitional process, though each of the photographs shows that the final stage of the energy release supports approximately the model of a thermal dome pattern. In the model, it is referred to consideration in an approximated formulation for a mathematical solution with an infinitely asymptotic solution. The solution is apparently independent of the time factor in this work under the assumptions and the given conditions. This solution could be taken to be an approximated thermal dome pattern.

An application of the model introduced in this work might be well considered for the heat island developed in the urban area seems to be supporting the solution in this work [2]. Adding to the above, a case of continuous volcanic explosions could be realized even though the volcanic processes are not so simple in fact.

A set of approximated linear equations are introduced for the formulation in this work, The solution looks to be supported by the optical monitoring of the thermal dome in the atmospheric layer on the earth boldly. A nonlinear problem with a consideration of time variable must be raised for the next step in order to promote the related research works.

7. CONCLUSIONS

The author noted some specific pattern of the thermal dome as a solution in an approximated linear problem in relation to a possible pattern of the thermal dome in the actual atmospheric layer on the earth surface. Some remarks are given for application of the thermal dome model. The next step must be to develop this work in a nonlinear problem to obtain a more strict solution. A numerical computation must be more helpful for realizing what is the thermal structure inside the thermal dome model. A more advanced research is expected for understanding the thermal dome formation process.

REFERENCES

[1] Kimura, R. 1983 Introduction to geophysical hydrodynamics, Tokyo-Do Publisher, Tokyo, 247p.
[2] Kimura, R. 1975 Dynamics of steady convections over heat and cool islands, Journal of Meteorological Society of Japan, Vol.53, pp.440-457.
[3] Araki, T., and H . Motojima 1979 The effects of explosive nuclear energy releases at Hirosima and Nagasaki, Iwanami Publishers, Tokyo, 504p.

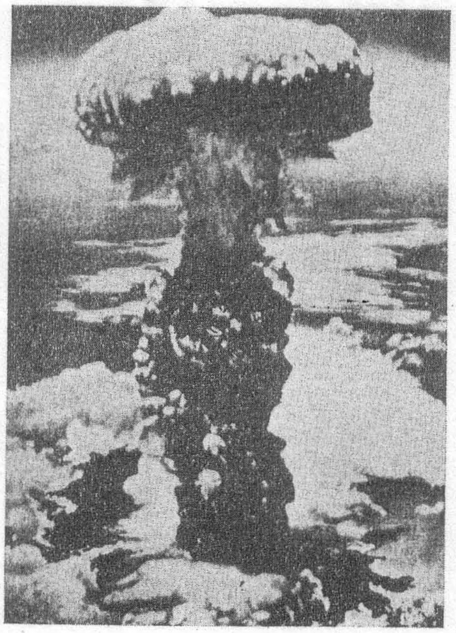

Figure 1 Thermal dome pattern at an explosive nuclear energy release on 9 August 1945 at Nagasaki [3].
(by the courtesy of USAF).

THERMAL DOME ON THE OCEAN SURFACE

Shigehisa Nakamura
Kyoto University, Japan

Abstract- This is a note about a case of thermal dome formed after an explosive energy release in the ocean surface layer on the earth. A theoretical model is introduced for realizing the pattern of the thermal dome in a mathematical expression. The solution is constructed by the main factors related to the physical process of the dome formation. Some notices are given to see what about the actual pattern was monitored.

1. INTRODUCTION

In order to realize specific pattern of the thermal dome formed in the atmospheric layer on the ocean surface layer covering a coral lagoon on the earth crust. For a convenience, a linear formulation is introduced under an assumption of no circular motion around a thermal source point. A solution is expressed by several physical factors which help us to see what specific thermal dome pattern is. Actually the process of the thermal dome must be a kind of non-linear one, nevertheless an approximated process could be obtained by solving a linear problem. Then, it could be given some remarks for the following works to an advanced research and applications.

2. SAMPLE CASE OF THERMAL DOME

In order to demonstrate a thermal dome in the atmospheric layer above the ocean surface layer which covering a coral lagoon on the earth crust, a model is assumed to be constructed by a fluid dynamics of atmosphere in the troposphere between the tropopause and the earth surface.

In the troposphere, vertical distribution of the atmospheric temperature can be described as

$$T(z) = \Gamma z + T_0, \quad \cdots\cdots (1)$$

Where, $T(z)$ is an equivalent potential temperature at the height above the sea surface, and $T_0 = T(z{=}0)$. In the actual atmospheric layer, it can be expressed as Γ=4℃ per 1000m (for example, Kimura [1])

As for a case of heat island in an urban area, Kimura had written his brief note in his publication [2]. In this case, a local small area on the earth surface is assumed as a heat source (positive for heating or negative for cooling) of the thermal dome formed on land. There has no land surface condition considered except the atmospheric condition.

As for the ocean surface layer, an assumption is as that the uniform thermal layer of the sea water about 200m or less. Under the sea surface, a spread of coral lagoons is considered to over the earth crust.

A heat source is assumed to be a point source just under the ocean surface.

As for the mean field of winds above the sea surface, this field is excluded out of the resultant field of the winds in order to distinguish the variations of the wind field which is generated and affected by an energy release at the heat source located at the origin of a co-ordinates system. When the heat source is assumed to be located at a point, a convenient co-ordinates system must be in a semi-spherical field on the sea surface, and a cross section of the interested thermal dome might be expected as a semi-circular space above the sea surface.

3. FORMULATION

Now, assuming a semi-spherical co-ordinates system $(r,\ \theta,\ \phi;\ t)$, each of the velocity components in the interested field can be expressed by gradient of r, θ, and ϕ, respectively. Considering the axis of r is taken to be vertical positive and the plane formed by the axes θ and ϕ fit on the ocean surface with the origin 0, then, the velocity field can be expressed as follow if the angular velocity is negligible for an assumption of only rotational motion but any motion across the circular shell of the semi-sphere. That is,

$$[u(r,\ \theta,\ \phi;\ t),\ v(r,\ \theta,\ \phi;\ t),\ w(r,\ \theta,\ \phi;\ t)]=[u(r,\ \theta;\ t),\ v(r,\ \theta;\ t),\ w(r,\ \theta,\ t)] \ldots\ldots(2)$$

when zero velocity for the radial component of ϕ.

Then, equation of motion for the interested process is written as follow for the cross section:

$$(\partial u/\partial t) + u(\partial u/\partial t) + v(1/r)(\partial u/\partial \theta) = -(1/\rho)(\partial p/\partial r) + \alpha g T + \nabla(\nu \nabla u) \ldots.(3)$$

and,

$$(\partial v/\partial t) + u(\partial v/\partial r) + v(1/r)(\partial v/\partial \theta) = -(1/\rho)(\partial p/\partial \theta) + \nabla(\nu \nabla v) \ldots\ldots\ldots\ldots\ldots(4)$$

As for the equation of potential temperature in the atmospheric layer,

$$(\partial T/\partial t) + u(\partial T/\partial r) + v(1/r)(\partial T/\partial \theta) + v\Gamma = \nabla(\kappa \nabla T) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(5)$$

When the thermal energy radiation is radiated at the point source located at the origin, the thermal disturbances out of the heat source is essentially propagate radial.

4. PATTERN OF THERMAL DOME

In a case of thermal dome produced by the enormous amount of thermal energy release as a result of a nuclear reaction process, it can be expected a radial propagation of the front formed by the thermal energy radiation quickly before any thermal convective motion is induced in the atmospheric zone. A spherical shock front might be formed even if any human body was on the paths of the thermal radiation.

When the energy was radiated after a nuclear reaction, the first radiation should be propagated in the speed of the electromagnetic waves (that is to say, instantaneously). Then, thermal energy must be followed to that after completing the energy exchange process between the radiation beams out of the source and the atomic or molecular particles on the paths of the radiations of the electromagnetic power out of the source. This might be called “Fire Ball”. With the time elapse, the fire ball grew quickly in a short time. Inside of the fire ball, there might had been generated the complicated motions of the atmosphere trapped by the fire ball. The thermal energy in the fire ball might surely be diffused out across the surface of the fire ball.

The ocean water might be forced to be activated by the nuclear effect though the thermal effect to the ocean surface water was easily happened to generate an evaporated water mass pinnacle at the origin. The water vapor must have formed a dense cloudy column to make a mushroom shape shell just as the thermal front of the dome. The growth of the speed was so quick that there must surely be generated a spherical shock front because this speed is beyond the propagation speed of the electromagnetic waves induced by the nuclear reaction. One of the examples is shown in Figure 1. To the details, it must be seen in the other publications appeared already in the past [3].

5. EXPLOSIVE THERMAL ENERGY RELEASE

In Figure 1, a case of the explosive thermal energy releases is introduced. There might be any cases of the other similar thermal processes.

The author would here give a note to several patterns of the energy release.

(1) One of the most primitive examples is to make a fire by burning of wood tips or of charcoal carbon tips.
(2) Fossil fuels are effective in the history of the human activity.
(3) Dynamite is one of the typical materials as an explosive thermal energy release must be effective in practical purpose for public works. The dynamite was used for battle in the past.
(4) Nuclear reaction has been utilized for the electric power supply for the public works and citizen services under a well-controlled power release system. Nevertheless, the nuclear reaction (atomic fissures and/or fusions) was used in the world war in order to assure that this was effective to make an explosive thermal energy release as was widely known.
(5) Primitive nuclear reaction can be make an effective explosive thermal energy release after a trigger strong radiation beam to activate the all of the constituents in the atmosphere, in the waters and on the land surface. The activated materials are changed to be another form of forced radio-active materials which consist in any form of ashes produced at the nuclear reaction by the explosive energy release.
(6) The activated ashes were transferred into the atmospheric layer after induced convective winds to diffuse out around the surrounding areas.
(7) As for the case introduced in Figure 1, the ocean water and coral pieces are activated to be the contents of the strong radioactive isotopes. The accuracy of the trigger at each nuclear reactor must be caused to form a crown cap as a set of the main three sheets. The reflected radiations and shock front must be effective to form the minor set of the caps under the main caps set. The shock front in form of a fringe of the cloud on the land surface can be seen.
(8) The first step was the radioactive isotopes production in advance of the shock front in the atmospheric layer as a thermal dome.
(9) The explosive thermal energy release was the second step in the case of the nuclear reaction in the case of Figure 1.

To the details, it could be found what was seen at that time in the other publications.

6. CONCLUSIONS

The author has had a chance to see a process of a thermal dome after an energy release at a point source. Especially, the thermal energy is generated by a nuclear energy release might cause to form a shock wave as a front of the thermal dome in a form of a fire ball. The author could introduce in this work one of the examples out of the photographs of a thermal dome formed after a nuclear energy release on the ocean surface layer. This is a key to promote an advanced research successively.

REFERENCES

[1] Kimura, R. 1983 Introduction to geophysical hydrodynamics, Tokyo-Do Publishers, Tokyo, 247p.
[2] Kimura, R. 1975 Dynamics of steady convections over heat and cool islands, Journal of Meteorological Society of Japan, Vol.53, pp.440-457.
[3] Kawasaki, S. 2004 Fukuryuumaru-5 Memorial, Tokyo East Park, Tokyo, 104.

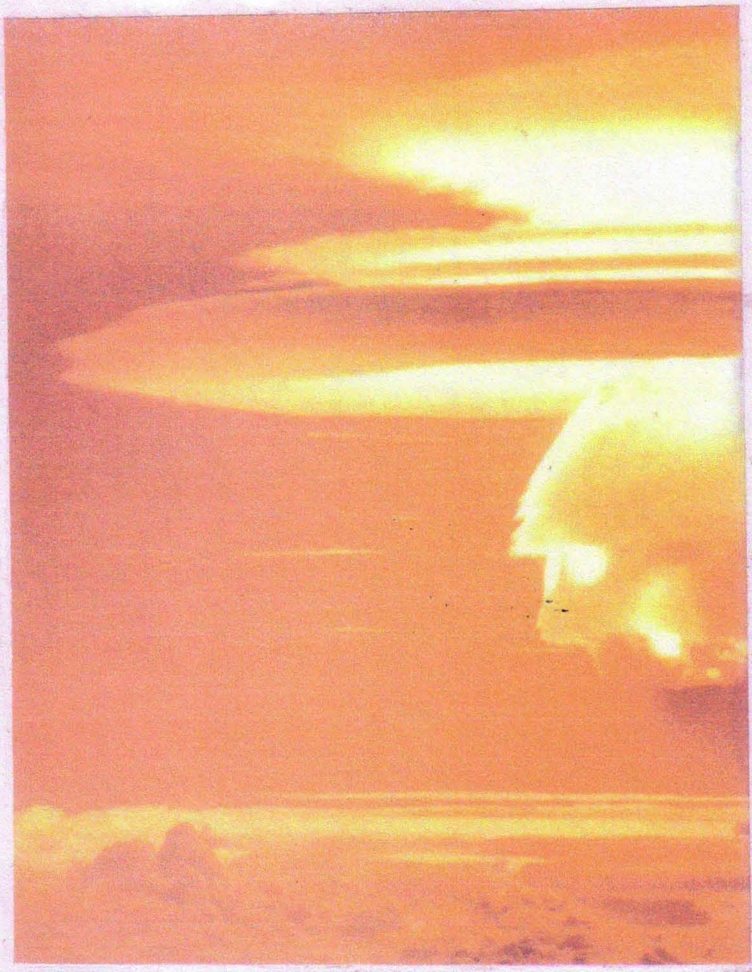

Figure 1 Thermal dome pattern at an explosive nuclear energy release on 1 March 1954 at Bikini Lagoon in the Northwestern Pacific. (by the courtesy of USAF)

THERMAL DOME ABOVE THE ATMOSPHERE

Shigehisa Nakamura
Kyoto University, Japan

Abstract- This work concerns to a thermal dome as an iridescent sphere appeared above the atmosphere. The author is a modeling for realize what is a possible process of iridescent sphere above the atmosphere in a physical scope. One of the iridescent spheres in the photographic illustration must be caused by a explosive thermal energy release. A simple formulation for the thermal dome may be effective for understanding the process of the thermal dome above the atmosphere. The author would introduce a key to see the physical process of this thermal dome formation.

1. INTRODUCTION

In this work, a process is noted by a model for a thermal dome as an iridescent sphere appeared above the atmosphere in a scope of fluid dynamics. By this time, the author has had monitored the thermal patterns on the ocean surface. His interest is also in the physical process of a thermal dome above the atmosphere. One of the keys must be obtained by introducing a dynamical model. In order to realize this process the author introduced some note in relation to a similar process ever seen on the earth surface.

2. DATA SOURCE

One example of the iridescent spheres appeared above the atmosphere off Scandinavia and northern China in 1988 [1]. The data is found in a form of photographic illustration. That is, Reed [1] introduced one of the typical illustrations of the iridescent spheres. This illustration was one example provided by Danny Stillman. In this work, simply the author would focus his interest to introducing a physical model of the thermal dome.

3. ATMOSPHERIC LAYER

The interested atmospheric layer in this work must be between tropopause and earth surface. This layer is called as troposphere. In the troposphere, atmospheric convection is taken to be constructed to be a conservative system. In the troposphere, vertical distribution of the atmospheric temperature can be described as

$$T(z) = \Gamma z + T_0, \qquad (1)$$

where, $T(z)$ is an equivalent potential temperature at the height z above the earth surface, and $T_0 = T(z=0)$. In the actual atmospheric layer, Γ=4℃ per 1000m (for example, Kimura, [2]).

4. FORMULATION

In the scope of hydrodynamics, a model is introduced in a form of mathematical formulation. Generally, the model should be for three dimensional in process. Essentially, the equation of motion introduced is nonlinear, though a linealized approximation in the equation could be considered with a fairly good approximation. In this case, the equation for the potential temperature should be also introduced.

5. CONDITIONS

In the model, boundary conditions must be considered for T on the earth surface and the tropopause. Mean field of the winds is excluded so that the disturbances can be obtained an approximated solution solving the linealized equation. Nevertheless, a case of a thermal sphere above the atmosphere can be taken as free from the boundary conditions, if the thickness of the atmospheric layer is large enough comparing to the scale o the thermal dome in interest.

Several cases must be considered at solving the equation to see the process. That is,

(1) Fireworks using a gunpowder in a classic manner
- (a) Shoot up vertically in order to get the capsule up to the aimed altitude,
- (b) The trigger let the capsule to fire at no vertical motion where the capsule in height of the aimed altitude successfully.

(2) Environment control by using dynamite
- (a) Set up the position of the firing operation in the schedule,
- (b) Follow the land-cruisers, shovels, and scrapers
- (c) Pass a roll over for flatten the ground surface or the related operations.

(3) Operate to fire or crush in the certain position in the atmospheric layer
- (a) Shoot up a capsule containing a gunpowder, or trinitrotoluene, or nuclear reactor,
- (b) Control to work the trigger for firing or for the purpose in plan.

To the details, it is recommended to refer to the other related guidelines.

6. DISCUSSIONS

For a convenience, the author here introduce some discussions about the illustration as shown in Figure 1 in order to realize the process of a thermal dome formation. Looking at the pattern of the dome, it can be seen that a point source moving in the atmospheric layer at the trigger for firing in operation. A line of light in the dome area seems to be suggesting the orbit of the capsule on a ballistic orbit. The author has no data to the details so that it seems too hard to tell a certain deterministic notice. Nevertheless, the past examples of the explosive thermal energy release are taken to show us an essentially common process is found in the illustration. What is essential is axis of the acceleration.

Reed [1] noted that the thermal dome is expanded very rapidly, at around 3km/s, with the centers remaining quite transparent. The author has no idea to give any comment for the speed of the dome expanding. Although, it is sure that this speed is about one third of the critical velocity on the ballistic orbit, and is also approximately one third of the speed of an existing satellite in the steady polar orbital motion.

As far as the author concerns, he thinks that it is hard to give any deterministic notice under this condition without any detail of the scientific data in need.

7. CONCLUSIONS

A model of a thermal dome above the atmosphere is introduced in order to what process was in the illustration including an ilidescent sphere. With consideration of the related factors and conditions, the author may take it as that the illustration is showing a thermal dome formed around the axis of the acceleration along the ballistic orbit.

REFERENCES

[1] Reed, T. C. 2008 The Chinese nuclear tests, 1964-1996, Physics Today, Vol.61, No.9, September 2008, the American Institute of Physics, pp.47-53.
[2] Kimura, R. 1983 Introduction to geophysical hydrodynamics, Tokyo-Do Publisher, Tokyo, 247p.

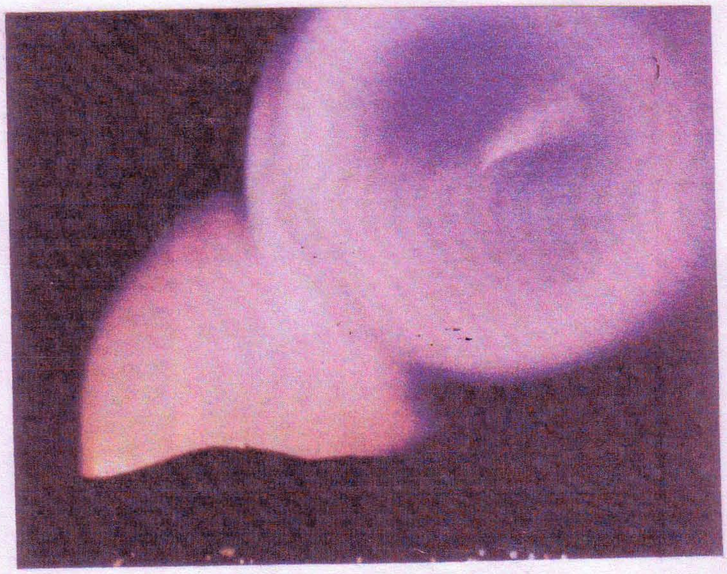

Figure 1 One example of the iridescent spheres appeared above the atmosphere off Scandinavia
(by the courtesy of T. C. Reed and Danny Stillman)

3. AURORA

(1) Aurora Oval and Solar Winds

(2) Hazardous Aurora over the Ocean

AURORA OVAL AND SOLAR WINDS

Shigehisa Nakamura
Kyoto University, Japan

Abstract This work concerns to a problem on satellite monitoring of the aurora oval on the earth in relation to solar winds. First, a brief review is introduced for helping of our understanding of what relation is between the earth and the solar winds. A history of dawn in geomagnetism is also noted briefly. The advance of research works helped to get a mosaic illustration of the aurora which was monitored by an aurora scanner mounted on a polar orbital satellite.

1. INTRODUCTION

This work concerns on satellite monitoring of the aurora oval on the earth in relation to solar winds. First of all, a brief review is given for help of our understanding of what is seen in the solar-earth system. The earth is approximately taken as a dipole-magnet in order to realize the earth's main field. The variation of magnetic field on the earth is consisted mainly by the effect of ionized particles flowing in the atmosphere with some minor effects by the ocean tides and the solid earth crusts. Nevertheless, the mechanism of the aurora has to be realized after consideration of the solar winds which distort to form a shade of the magnetopause in the solar-earth planetary system. The shade front to the sun was found at a distant of about eight times of the earth's radius in the early age (cf. monitoring by Exploler-12). A brief note is introduced about the history of dawn in geomagnetism is also noted. The advance of the research works by the scientists helped to obtain the first mosaic illustration of the aurora oval boreares after the satellite monitoring by the aurora scanner mounted by a satellite on a polar orbital satellite.

2. DAWN OF GEOMAGNETISM

A primitive model of the earth had been taken as a planet of a simple dipole magnetic model. In these years, it has been understood that the magnetic field of the earth is not so simple referring to the data compiled by the various instruments and to the theoretical models developed for the model of the earth's magnetic field [1]. Main field is taken a magnet which is essentially same to a small magnet for students in primary educational course.

Christian Birkeland in Norway visited Henri Poincare in Paris first for learning Maxwell's theory of electromagnetism. After that, Birkeland learned electromagnetic wave under H.Herz. In 1895, many works had been done by the scientists about properties of X-ray. Then, Birkeland started his research and survey on the aurora boreares. His first expedition was in 1897. He found that the aurora appears higher position than any cloud in the atmospheric layer in his second expedition (1899-1900). Birkeland introduced a model of solar-originated electrons incidence in order to illustrate the geomagnetic variations found by his expedition and by the project of the IPY (International Polar Year). Birkeland published his contributions in "Norwegian Polaris Expedition". This might be the theoretical contribution of aurora in our understanding of the modern works presented by the scientists even in the 2010 age.

3. MODERN RESEARCHES

As far as we concern, the magnetic field of the earth had been understood as a dipole model in the primitive pattern. Nevertheless, it has been developed an advanced research for a more reasonable electromagnetic hydrodynamics in order to have a proper modeling under our renewal of modern knowledge of the earth's internal structure. This is the key to introduced the recent dynamo-theory for the earth's main field describing by the poloidal and toroidal modes.

In addition, the solar winds as an uniform plasma flow may force to form a shell of the magnetopause and to distort the magnetic field of the planet earth (cf. Figure 1).

On the other hand, several observation projects were in schedule as the International Polar Year (in brief, IPY-1 and IPY-2) and as the International Geophysical Year (IGY).

Electromagnetic understanding of the solar-earth system has been advanced to obtain a modeling image of a giant magneto-hydrodynamic dynamo. By this time, the scientists had the research projects of IPY as the IPY-1 (1882-1883) and the IPY-2 (1932-1933). Chapman and Bartels (1940) have introduced a model of a quiet day variation (Sq) in the geomagnetic variations. The model supports the harmonic analyses in Kyoto University for the IPY-1 data of the stations settled on the earth. Hirono had introduced his dynamo-theory in 1957 after Elsasser's hydromagnetic-dynamo theory [2]. The advanced project as IGY (1957-1958) was extended to start the Antactic Research Program in a long term scale. Research on ionosphere had promoted during survey of the radio wave propagation to find E, F1 and F2-layers in a scale of the earth after O.Heaviside's notice of a conductive layer which could form a wave guide of electromagnetic waves between the ocean surface and the interested conductive layer. As for the aurora, Birkeland published Norwegian Aurora Polaris Expedition (1913). Here, the author feels it necessary to note that Birkeland was acquainted to Aikitu Tanakadate, Torahiko Terada, Hantaro Nagaoka in Japan. Significant contributions were by, for example, Alfven in 1950 and Stermar in 1955. A more advanced publication must be that written by Chapman in 1964 [3].

4. RADIATION IN UPPER ATMOSPHERE

Van Allen (Iowa State University) had some observations of the radiations in the upper atmosphere (1952-1953) by using several rockets. Then, he had found that some strong radiations were concentrated just in the aurora oval zone. After this finding, he had a chance to obtain some records by using his Geiger-counter for radiations. It was the first time of that the radiation belts were found by the sensors mounted on some artificial satellites. Some works are for the radiation belt enhancements appeared in the references (cf. [4] and [5]).

Later, it was clarified that the radiation belts (inside and outside) had no relation to the possible electron beam to induce the aurora. To the details, it should be referred to the other publications. Simply, the author notes that the belt denoted E in Figure 2. The magnetopause facing the sun (day light side) is in a shape of conical form and the magnetopause in the shadow zone (dark night side) is in a form of a tail.

The inside zone in the tail of the magnetopause is taken to be filled by plasma. A part of the plasma in the tail near the earth is in a form of plasma sheet on the equatorial plane. The extension of the plasma sheet separated in to two part (northern and southern) to contact on the earth surface. So that, it should be noticed that the solar winds in a form of an uniform plasma flow could hit the consisting atoms and molecules just outside of the plasma sheet to hit and activate the upper atmosphere which could be taken us as a kind of the visible aurora boreares. The aurora oval on the earth might be found in the fresh reports in these years, for example, Mandea and Papistoshvili [6].

5. SATELLITE MONITORING

Akasofu (1981) has given a digestive illustration for his review on the research of the aurora. Loomis had completed his map of the aurora oval boreares one hundered years before the IGY (1957-1958). Optical aspect of the aurora had clarified that the aurora was appeared when atoms and molecules in the atmosphere were exited stage under some specific condition. With the above noticed contributions, problem raised was to see the aurora oval by using an aurora scanner mounted on a artificial satellite in a polar orbital motion. One of the most typical cases was the aurora oval monitored by the satellite ICIS-2. The result of a monochromatic mosaic illustration of the aurora boreares was obtained by C.D.Anger. C.D.Anger at Calgary University in Canada had used his phototube applied system of an electric circuit for monitoring aurora oval in the northern hemisphere.

A geomagnetic flux field in the aurora oval zone is schematically introduced as shown in Figure 3. Since then, it is aimed to continue satellite monitoring of aurora boreares (which was presented at Kyoto in1973). The polar orbital motion of the satellite had given aurora australis too (for example, National Polar Research Institute, Japan).

6. DISCUSSIONS AND CONCLUSIONS

This satellite monitoring of the aurora is surely be effective to see the more detailed structure of the aurora. As the results of the research on the aurora, it is confirmed that the ionized particles of the solar winds might surely be a trigger to induce an activated energy level of the gasses in the atmosphere (especially, the atoms and molecules of oxygen and nitrogen). This energy transfer makes it possible to form the visible aurora in the aurora oval zone in a high speed to ionize by transferring to the atoms and the molecules of oxygen and nitrogen. At this stage, the author has to notice that it is necessary to continue the successive satellite monitoring of the aurora for our advanced research.

REFEFERENCES

[1] Chapman,S., and J.Bartels 1940 Geomagnetism, Oxford University Press, London, 1049p.
[2] Elsasser,W.M. 1956 Hydromagnetic dynamo theory, Reviews of Modern Physics, Vol.28, pp.135-163.
[3] Chapman,S. 1964 Solar prasma, geomagnetism, and aurora, Gordon and Breach, N.Y., 141p.
[4] Summers,D., R.M.Thorne, and F.Xiao 1998 Relativistic theory of wave-particle resonant diffusion with application to electron accerelation in the magnetsphere, Journal of Geophysical Research, Vol.103, No.20, p.487.
[5] Liemonhn,M.W., and A.A.Chan 2007 Unraveling the cause of radiation belt enhancements, EOS (Transaction, American Geophysical Union,), Vol.88, No.42, pp.426-427.
[6] Mandea,M., and V.Papistoshvili 2009 World wide geomagnetic data collection and management, EOS (Transaction, American Geophysical Union), Vol.90, No.45, pp.409-410.

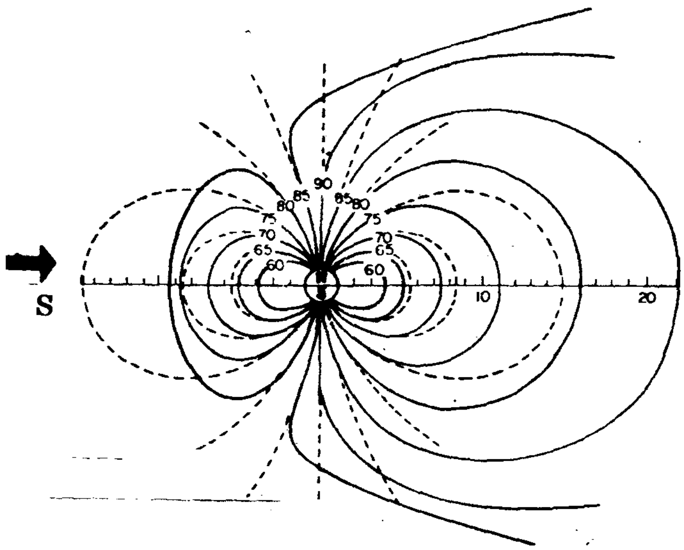

Figure 1 Magnetic field of dipole-Earth distorted by solar wind.
(1) dot-line for dipole-Earth field, (2) full-line for distorted field,
(3) arrow for solar-wind [modified from Akasohu,S.-I., 1975]

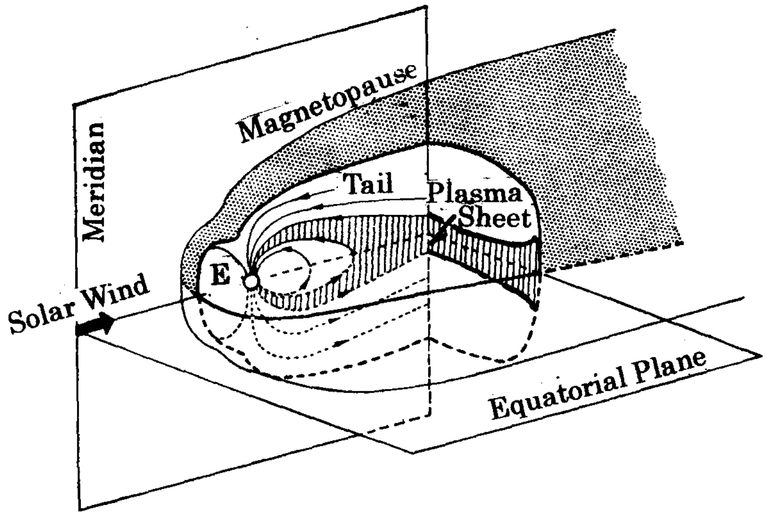

Figure 2 Solar-Earth system.

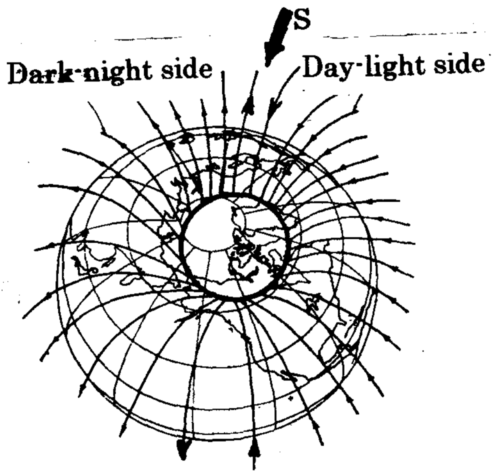

Figure 3 Electric-current around "Aurora Oval Boreares"

[by the courtesy of Akasohu,S.-I.]

HAZARDOUS AURORA OVER THE OCEAN

Shigehisa Nakamura
Kyoto University, Japan

Abstract- This is a note to aurora in day light side of the earth in relation to the solar plasma flow. The solar plasma flow in a super high speed forces to form a shock front just in front of the magnetopause between the sun and the earth. The intrusion of the electron into the aurora oval zone along the magnetic line releases its energy to form a visible aurora. It is up-dated what process is reasonable to see the coloring of the interested aurora. An additional notice is given to see a non-natural energy release for a dark red sky in the subtropical zone on the ocean.

1. INTRODUCTION

This work concerns the aurora which can be seen in the polar area around the north pole of the earth. It is said that some note was left about a red aurora boreales in one of the old records, for example, Nihon-Shoki, edited in 720AD (as noticed Sadami Matsumoto). Birkeland must be the first aurora scientist who published the Norwegian Aurora Polaris Expedition (1902-1903) in 1903 as a part of the International Polar Year (IPY-1, 1882-1883). After IPY-2 (1932-1933), Chapman [1] published "Geomagnetism" in which the contribution of the geomagnetic daily variation Sq in a solar quiet day. In Kyoto University, Motokazu Hirono had given his theoretical model of geomagnetism with the poloidal and toroidal modes in 1957 for the advanced course of geophysics. Takeshi Nagata promoted the IGY (1957-1958) in the Asian area In the first Antarctic Research Project in Japan, the leader on-site at the base settled on Antarctic was Eizaburo Nishibori, and Tai'iti Kitamura was the first scientist of aurora Australius. There have been many researches on ionosphere and on aurora as well as on geophysics.

There are many problems on geomagnetism in relation to ionosphere and aurora.

In this work, the author concentrates his interest on the problems on monitoring aurora in day light side of the earth in relation to the solar plasma flow. This solar plasma flow was ever named as solar wind.

Specific feature of the aurora found in day light side of the earth is noticed in contrast to the aurora found in dark night side of the earth.

The author notes briefly about a non-natural dark red sky found not in or inside of the aurora oval but in the subtropical zone on the ocean. The author wishes to have a more advanced contribution for realizing the aurora in the next following age.

2. SOLAR PLASMA FLOW

The solar plasma flow is propagates as a reflection of the solar activity. The author has his understanding that the solar activity is evaluated after monitoring the variations of the surface of the sun facing the earth. The details of the mechanism of the solar activity are not yet clear even in a scope of science though the eleven years solar cycle is strongly effective to the earth surface variations.

It has been aware the effect of the solar activity or of solar wind. Chapman [2] had given us the new term of "solar plasma" instead of the solar wind. The term "solar plasma" is expressing itself the scientific specific pattern of the solar wind in relation to geomagnetism and aurora.

3. AURORA IN DAY LIGHT SIDE

In this work, a note is introduced for problems on monitoring aurora in day light side of the earth in relation to the solar plasma flow. The solar plasma flow (the solar wind) distorts the geomagnetic field to form a magnetopause (cf. Figure 1).

By this time the aurora scientists have believed that the solar plasma flow (the energy of the electron – ca 50 eV or 50 electron Volt) at a super high speed so that a shock front is appeared just outside of the magnetosphere. It has been monitored the aurora in the day light side of the earth after the energy of the electron increased between the shock front and the magnetopause (ca 100 eV). This electron is the trigger of the red aurora (630.0 nm). On the basis of the surveys it is clarified that the polar cusp is a guide of the intruding electron of the solar plasma along the magnetic line into the upper atmosphere of the earth as shown in Figure 1. This red aurora is induced after energy release of the oxygen at the altitude of 200 km or more above the earth surface at intruding electron (ca 500 km/sec). Now, it should be noticed that the energy release of the electron to activate the oxygen atom is an order of several KeV in the visible aurora curtain (557.7 nm) found in the dark night side of the earth.

4. ALTITUDE OF AURORA

It is said that the altitude of the aurora boreares is depending on the incident electron out of the solar plasma into the polar oval zone as a aurora electron. An empirical result has been introduced as shown in Figure 2 in order to see what is the critical altitude of the aurora electron intrusion in a diagram of the critical altitude H above the earth surface and the counted number N(per cubic-cm second) of the ionized gas particles by the energy of the aurora electron ($1/cm^2$).

The author has to consider here what process is possible to release the aurora energy for the bright light line in the visible band at applying technique of spectroscopy.

The aurora electron at the critical altitude surely must have exhausted so that no energy can be effective to ionize or activate the gas particles in the atmosphere for making a bright light line of spectroscopy in the visible band.

The aurora scientists seems to consider that the aurora electron affects directly to transfer energy to the atoms and the molecules of oxygen and nitrogen in order make the visible bright light. The author is unfortunately the details of the illustration shown in Figure 2. The aurora electron should be exhausted at the critical altitude just neighbor the earth surface.

5. AURORA IN VISIBLE BAND

Adding to the above, the bright line band noted the above section seems not to be consistent to what had been observed and recorded in any color print on the hard copy.

As far as the author concern, it should be considered that the aurora electron transferred to the hydrogen molecules for ionization and activation first. When the ionized and activated hydrogen release its energy, the visible light must be seen as the specific bright light line in the spectroscopic analysis. This bright light line has to have the specific one for the related hydrogen. As for the hydrogen, four visible bright light lines are known.

Introducing the bright light line of spectrum for the ionized hydrogen, it is understood to be a more consistent relation between the aurora observed optically and the bright light line of spectrum of the interested hydrogen.

For a convenience, the four bright light lines for the hydrogen is introduced as follow:

Balmer Series	Wave Length (nm)	Color	Band Zoning
	—	Infra-Red Band	(770 nm<)
Hydrogen – α (1)	656.285	Red-Band Zone	(770-640 nm)
– α (2)	656.273	Red-Band Zone	(770-640 nm)
	—	Orange-Band Zone	(640-590 nm)
	—	Yellow-Band Zone	(590-550 nm)
	—	Green-Band Zone	(550-490 nm)
– β (3)	486.133	Blue-Band Zone	(490-430 nm)
– γ (4)	434.047	Blue-Band Zone	(490-430 nm)
	—	Violet-Band Zone	(430-380 nm)
	—	Infra-Violet Band	(380 nm>)

In the case of solar quiet day, the red aurora in the day-light side appears by chance. No detail is known even at present.

In the case of the solar burst, the strong disturbances are found in the aurora pattern, in the ionosphere behaviour, and in the geomagnetic fileld, which is called as "storm" [3].

6. MAN-MADE AURORA

The author here introduces one case of the non-natural energy release producing a similar pattern to the red aurora found in or inside of the aurora oval in the subtropical zone of the ocean.

After what is reported by Charles Day [4], his head-line of the report is like that "A high-altitude nuclear explosion would swell the radiation belt and imperil the global positioning system and other satellites. VLF transmission could forestall the damage".

A happening was as follows. Day introduced that was on 1962 July 9. No solar storm has jolted the earth's inner radiation belt more than the nuclear test. On that day, the US exploded a 1.4 megaton nuclear warhead 400 km above Johnston Atoll, a remote group of the Pacific Islands. In Hawaii, 1400 km away, it was lit up the sky, knocked out street lights, triggered burglar alarms, and fused power lines (cf. Figure 3). Beta particles from the blast flooded the thin upper reaches of the atmosphere. Trapped by earth's magnetic field, the high-energy particles swelled the inner radiation belt. Seven satellites were damaged or put out of action. The radiation took more than a decade to dissipate. Alarmed by the unintended consequences, the nuclear powers banned testing in and above the earth's atmosphere in 1965. Some related notice could be obtained in Geophysical Research Letters (Vol.35, L09101, 2008) written by J.-A.Sauvaud, R.Maggiolo, C.Jacquay, M.Parrot, J.-J.Berthelier, R.J.Gamble, and C.J.Roger.

Even this case of the man-made auroras, the process is same in the scope of science.

REFERENCES

[1] Chapman,S., and J.Bartels 1940 Geomagnetism, Oxford, Clarendon Press, 1049p.
[2] Chapman,S. 1964 Solar plasma, geomagnetism and aurora, Gordon-Breach, New York, 133p.
[3] Alfven,H. 1950 Cosmic electrodynamics, Oxford, Clarendon Press, 237p.
[4] Day,C. 2008 Very low-frequency radio waves drain earth's inner radiation belt of satellite-killing electrons, Physics Today, Vol.61, No.8, pp.18-21.

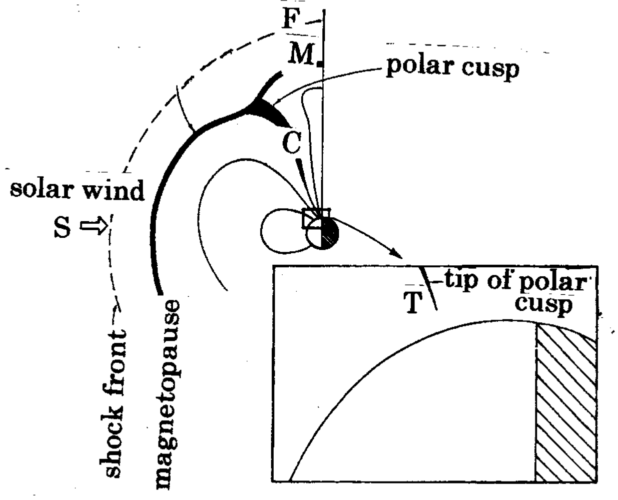

Figure 1 Structure between solar plasma flow and polar tip.
(1) solar plasma flow for S ,
(2) schock front for F,
(3) magnetopause for M,
(4) polar cusp for C,
(5) tip of polar cusp for T (inset).

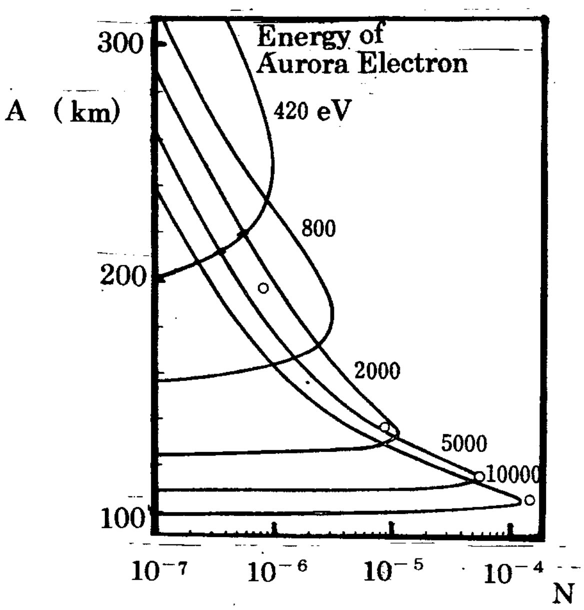

Figure 2 Count number of gas particles ionized by aurora electron.
(1) N—for number of ionized gas particle (number per cubic cm-sec),
(2) A – for altitude above the earth surface (km),
(3) Parameter – for energy of aurora electron (electron Volt = eV).

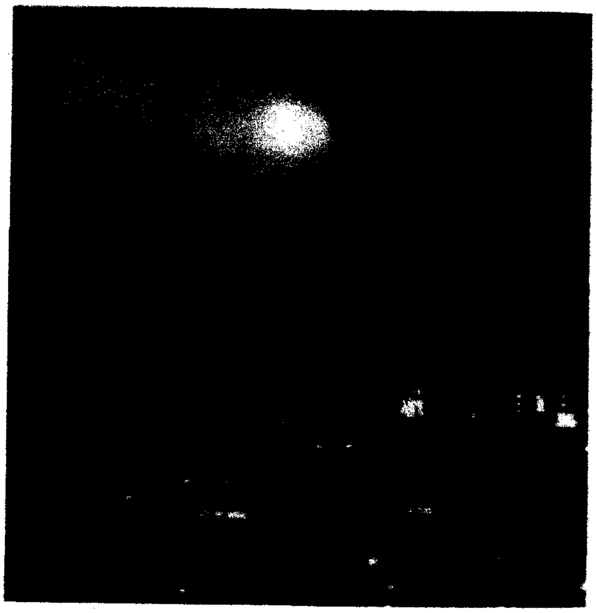

Figure 3 Glowing red sky after a nuclear test.
(1) Glowed red sky over Honolulu in Hawaii,
(1400 km away),
(2) Nuclear test – 400 km above Johnston Atoll,
(on 1962 July 9),
(3) X-rays from the nuclear test excited atomic oxygen
In the upper atmosphere (Thermosphere).

[by the courtesy of USAF]

Figure 3 Glowing red sky after a nuclear test.
(1) Glowed red sky over Honolulu in Hawaii,
(1400 km away),
(2) Nuclear test – 400 km above Johnston Atoll,
(on 1962 July 9),
(3) X-rays from the nuclear test excited atomic oxygen
In the upper atmosphere (Thermosphere).

[by the courtesy of USAF]

APPENDCES

Pubished Papers [1996 to 2010] Shigehisa Nakamura

1996 S.Nakamura An extent of sea surface layer affected by an earthquake, Marine Geodesy, Vol.19, pp.281-289

1997a* S.Nakamura A linear problem on subsurface variations at a tsunamigenic earthquake, Recent Advances in Marine Science and Technology 1996, PACON Iternational, edited by N.Saxena, pp.65-75.

1997b S.Nakamura A notice to the 1995 Kikaijima tsunami, memo, La mer, Societe franco-japonaise d'oceanographie Tokyo, Tome 35, pp.123- 124..

1997c S.Nakamura An example of observed thermal structure of sea surface at an offshore fixed tower, memo, La mer, Societe franco-japonaise d'oceanographie, Tome 35, pp.125-126.

1997d S.Nakamura A note on the 1995 Chilean tsunami, memo, La mer, Societe franco-japonaise d'oceanographie , Tome 35, pp.127-128.

1998a* S.Nakamura Elevation changes associated with a tsunamigenic earthquake, Science of Tsunami Hazards(The International Journal of the Tsunami Society), Vol.16, No.1, pp.51-54.

1998b* S.Nakamura Sea state model for thermal satellite data, Proceedings of the 4th Pacific Ocean Remote Sensing Conference(PORSEC98), Qingdao, China, 1998 July 28-31, pp.240-242.

1998c* S.Nakamura A dynamical understanding of Kuroshio front, Proc. of the 3rd International Conference on Hydrodynamics, Seoul, Korea, 12-15 October 1998, eds.by H.Kim,S.H.Lee and S.J.Lee, UIAM Publishers, pp.449-453.

1998d* S.Nakamura Coastal waters and land-ocean interaction, ISEH98 (International Symposium on Environmental Hydrodynamics), December 1998, No.112, pp.1-5.

1999 S.Nakamura On a relation between tsunami source and seismic fault, memo, La mer, Soc. franco-japonaise d'oceanogr., Tome 37, pp.81-83.

2000a* S.Nakamura A satellite thermal monitoring of the western boundary currents in the ocean, Cape Town Proceedings, 28th Symposium on Remote Sensing of Environment(CD-edition), 2000 Mar.27-31, Cape Town, South Africa, CSIR, Climatology, pp.56-59.

2000b* S.Nakamura Interannual Sea level variations and annual tides in the Northwestern Pacific, Marine Geodesy, Vol.23, pp.55-61.

2000c* S.Nakamura Classification of thermal patterns as oceanic fronts, PORSEC Proc., Vol.2, Goa, India, 5-8 December 2000, pp.575-578.

2000d S.Nakamura Interannual variations of coastal sea levels and annual tides spectra neighbor Kuroshio flow, memo, La me, Societe franco-japonaise d'oceanographie, Tome 38, pp.39-43.

2001a* S.Nakamura A crustal upheaval in a coastal zone after ocean water loading, Marine Geodesy, Vol.24, pp.229-235.

2001b* S.Nakamura Ocean front monitored by satellite and geophysical hydrodynamics, PACON 2001 Proceedings, Honolulu, PACON International, CD-ROM, pp.150-157.

2002* 中村重久 人工衛星と地球流体力学とからみた海洋計画[巻頭論文]、Vol.30,No.4, pp.2-4.

2004a S.Nakamura An introduction to equivalent elastic parameters for linear problem of earth's crustal undulation, Proceedings-International Symposium on Developments in Plasticity and Fracture (Centenary of M.T.Huber Criterion), August 12-14,Cracow,Poland, Ed.AGH Univ.Sci.&Tech.in Cracow, Stanislaw Wolny, p.63.

2004b S.Nakamura A possible mechanism of satellite signals of infrared band monitored real time thermal pattern of the earth,Proceedings PIERS2004, 2004 Aug 28-31, Nanjing, China, p.288.

2005a S.Nakamura Time space scaling of ocean front in satellite thermal patterns directly monitored, Marine Geodesy, (accepted #13-821).

2005b *S.Nakamura A note on tsunami bore front, Marine Geodesy, Vol.28, No.4, pp.305-312.

2005c* S.Nakamura Focusing infrared beams out of sea surface found in satellite thermal pattern in the ocean, PIERS 2005 Proceedings, 22-26 August 2005, Hangzhou, China, pp.457-458.

2005d* S.Nakamura Focusing infrared beams out of sea surface found in satellite thermal pattern in the ocean, PIERS Online, Vol.1, No.4, 457-458, 2005, doi:10.2529/PIERS100510040800-[PDF Full Text (78KB)]

2006a S.Nakamura Apparently abnormal satellite thermal signals of infrared band as a thermal plateau on the sea surface, Abstracts-Progress in Electromagnetics Research Symposium(PIERS2006), March 26-29 2006, Cambridge, MA, USA, p.206.

2006b S.Nakamura Modelling satellite themal plateau on the sea surface, Marine Geodesy, (MGD#13-852,received and accepted).

2007a* S.Nakamura Monitoring of satellite thermal plateau in relation to concentration of infrared beams out of sea surface waves, PIERS 2007 Beijing Proceedings (Progress in Electromagnetics Research Symposium 2007), March 27-30 2007, Beijing, China, CD-ROM, pp.326-327.

2007b* S.Nakamura Monitoring satellite thermal pinnacle in relation to spatial spectrum of sea surface waves, PIERS 2007 Beijing Proceedings (Progress in Electromagnetics Research Symposium 2007), March 26-29 2007, Beijing, China, CD-ROM, pp.328-329.

2007c* S.Nakamura Monitoring of satellite thermal basin in a slope of mountain range, Abstracts-Progress in Electromagnetics Research Symposium (PIERS2007), August 27-30 2007, Prague, Czech, CD-ROM, p.97.

2007d* S.Nakamura Relation between natural hazards and radiation damages,2007 Aug.9, http://repository.kulib.kyoto-u.ac.jp/dspace/ .

2007e* S.Nakamura A contribution for the 2004 tsunamis in Indian Ocean, available at http://repository.kulib.kyoto-u.ac.jp/dspace/ .

2007f* S.Nakamura Satellite thermal monitoring of earth surface, available at http://repository.kulib.kyoto-u.ac.jp/dspace/ .

2007g* S.Nakamura A glance of electromagnetic waves around the earth and the space, http://repository.kulib.kyoto-u.ac.jp/dspace/ .

2008a S.Nakamura Monitoring of satellite thermal patch formed by a wave facet – Ocean surface water waves, Proceedings-Progress in Electromagnetics Research Symposium (PIERS2008), Mar. 24-28, 2008, Hangzhou, China, CD-ROM, pp.1101-1103.

2008b S.Nakamura Monitoring of satellite thermal pathch on the ocean surface induced by strong wind duration in mid-night, Proceedings-Progress in Electromagnetics Research Symposium (PERS2008), Mar. 24-28, 2008, Hangzhou, China, CD-ROM, pp.1104-1106.

2008c S.Nakamura Satellite thermal monitoring of ocean front evolution, Geophysical Research Abstract-EGU2008, Vol.10, 2008-A-01629, [OS6], 13-18 April 2008, Vienna, Austria, CD-ROM, p.1.

2008c S.Nakamura Monitoring of satellite thermal pattern of ocean front between coastal and ocean water, PIERS Proceedings, Progress In Electromagnetics Research Symposium, Cambridge, USA, July2-6, 2008, , pp.379-381

2008d S.Nakamura Monitoring of satellite thermal pattern in ocean front evolution, PIERS Proceedings, Progress In Electromagnetics Research Symposium (PIERS 2008), Cambridge, USA, July2-6, 2008, pp.32-35.

2008e* S.Nakamura Stefan Boltzmann radiation for satellite thermal pattern of geophysical processes, http://hdl.handle.net.2433/65030

2009a S.Nakamura Monitoring of satellite thermal patterns of ocean front evolution in relation to ocean water stratification, Proceedings-PIERS-Beijing, 23-27Mar2009, Bejing, China, pp.1511-1514.

2009b S.Nakamura Monitoring of satellite thermal patterns of warm core ring in subarctic sea surface, Proceedings-PIERS2009-Beijing, 23-27Mar.2009, Beijing, China, pp.1508-1510.

2009c S.Nakamura Monitoing of satellite thermal pattern in the Azores current area, Proceedings-PIERS2009-Beijing, 23-27Mar.2009, Beijing,China, pp.797-799

2009d S.Nakamura Ocean front evolution in relation to ocean climate in the North Atlantic, Geophysical Research Abstracts, Vol.11, EGU 2009-719, EGU Generl Assembly 2009, Vienna, Austria, p.1.

2009e S.Nakamura A paradox of polar ice melting caused by global climate change, Geophysical Research Abstracts, Vol.11, EGU2009-13538, EGU General Assembly 2009, Vienna, Austria p.1.

2009f* S.Nakamura Polar Orbital Ocean Circulation, 2009-May 01, Kyoto Univ., http://repository.kulib.kyotouniv.ac.jp/dspace

2009g* S.Nakamura Note to Solar Eclipse 2009, 2009 July 26, Kyoto Univ., 2009 July 26, http://repository.kulib.kyotouniv.ac.jp/dspace/

2009h S.Nakamura Monitoring of satellite thermal pattern of an ocean front as a hydrodynamic convergence, PIERS2009 Proceedings, 18-21 August 2009, Moscow, Russia, pp.971-974.

2009i S.Nakamura Monitoring of satellite thermal pattern of ocan front in relation to a double diffusion process, PIERS2009 Proceedings, 18-21 August 2009, Moscow, Russia, pp.975-977.

2009j S.Nakamura Monitoring of satellite thermal pattern of a drifting ocean front, PIERS2009 Proceedings, 18-21 August 2009, Moscow, Russia, pp.978-980.

2010a S.Nakamura Physical processes in radiation belts in magnetosphere of the planet earth, http://repository.kulib.kyotouniv.ac.jp/dspace/

研究論文リスト　－1964－1995　　中村重久

001 1964　名古屋港の潮流観測について
京大防災研究所年報,第 7 号,pp.410-419(樋口明生共著)

002 1964　防波堤開口部の潮流にともなう海底摩擦および垂直渦動粘性係数について
第 11 回海岸工学講演会講演集,pp.94-97

003 1965　A study on photoelectric current meters
Bull.DPRI,Kyoto Univ.,vol.15,pt.1,No.90,pp.63-70

004 1965　河口付近の異常水位に関する研究(1)
京大防災研究所年報,第 8 号,pp281-296(矢野勝正共著)

005 1965　名古屋港および明石川河口付近における潮流の二,三の特性
京大防災研究所年報,第 8 号,pp.439-457(樋口共著)

006 1965　東播海岸における潮流の二,三の特性について
第 2 回災害科学総合講演会論文集,pp.39-42(樋口共著)

007 1966　東播海岸の潮流について
京大防災研究所年報,第 9 号,pp.771-777(樋口共著)

008 1966　沿岸付近の潮流と渦度について
La mer, Tome 4,No.2,pp.108-110

009 1966　A note on tidal vorticity
La mer, Tome 4,No.4,pp.215-219

010 1966　河口付近の津波,うねりについて
La mer, Tome 4,No.4,pp.220-227

011 1967　大阪市内河川の高潮溯上に関する水理模型実験
京大防災研究所年報,第 10 号 B,pp.207-222(岩垣雄一,陳活雄共著)

012 1967　東播海岸における潮流について(2)
京大防災研究所年報,第 10 号 B,pp.365-373(樋口共著)

013 1967　高潮に伴う河口付近の流れについて
J.Oceanogr.Soc.Japan,vol.23,No.4,pp.175-181

014 1968　潮流のともなう渦度に関する研究
水産土木,vol.5,No.1,pp.47-53

015 1968　大阪市内河川の高潮溯上に関する水理模型実験(続)
京大防災研究所年報,第 11 号 B,pp.395-409

016 1968　大阪市内河川の高潮溯上に伴う流れについて
J.Oceanogr.Soc.Japan,vol.24,No.5,pp.234-241

017 1969　段波の発生とその発達に関する研究
京大防災研究所年報,第 12 号 B,pp.543-553(中川博次,市橋義臣共著)

018 1969 水圧式造波装置とその模型実験への応用について
京大防災研究所年報,第 12 号 B,pp.645-655

019 1969 Generation and development of a hydraulic bore due to the breaking of a dam(1)
Bul.DPRI,Kyoto Univ.,vol.19,pt.2,No.154,pp.1-17(H.Nakagawa and Y.Ichihasi : co-author)

020 1969 津波造波装置について
第 16 回海岸工学講演会講演集,pp.353-358(岩垣雄一,土屋義人共著)

021 1970 高知港の津波に関する模型実験
京大防災研究所年報,第 13 号 B,pp.471-488(岩垣,土屋共著)

022 1970 高知港の津波と振動特性に関する模型実験
第 17 回海岸工学講演会講演集,pp.435-439

023 1970 Model study of transformation of tsunamis in Urado Bay
Proc.12th Coastal Eng.Conf.,vol.3,ASCE,pp.2089-2102(Iwagaki and Tsuchiya : co-author)

024 1971 高知港の津波に関する模型実験(2)
京大防災研究所年報,第 14 号 B,pp407-413(岩垣,土屋共著)

025 1971 高知港津波模型による津波の変形特性に及ぼす河川流の影響について
第 18 回海岸工学講演会論文集,pp.229-233

026 1972 高知港模型における長周期波の特性について
第 19 回海岸工学講演会論文集,pp.231-235(土屋共著)

027 1973 On an effect of river discharge to tsunami in a model of Urado Bay
Proc.IAHR Int.Symp.on River Mech.,vol.3,C-18,pp.1-12

028 1973 O gidrraulicheskom bore I promenenii rezultatov egoizuchenia k probleme voznovenia I rasprostrania tsuami
Trudi simp.po tsunami(Proc.15th IUGG General Assembly, Moscow), Trudi Sakhalin KNII,Bipusk 32,pp.129-151(in Russian)

029 1973 水門に作用する段波の波圧について
第 20 回海岸工学講演会論文集,pp.161-167(土屋共著)

030 1973 On the shock pressure of surge on a wall
Bull.DPRI,Kyoto UNiv.,vol.23,pts.3-4,No.212,pp.47-56(Tsuchiya : co-author)

031 1974 不透過性防波堤による長周期波の制御に関する研究
第 21 回海岸工学講演会論文集,pp.91-96

032 1974 Shock pressure of tsunami surge on a wall
Bull.15 Roy.Soc.NZ(Proc.Tsunami Symp.),pp.177-185

033 1974 Tsunami suppressor on sloped bottom harbour
Bull.15 Roy.Soc.NZ(Proc.Tsunami Symp.),pp.165-175

034 1975 長周期波の制御における不透過性防波堤の効果について
第 22 回海岸工学講演会論文集,pp.285-288

035 1975 Study on suppression of long period waves by impervious breakwaters
Coastal Engineering in Japan,vol.18,pp.53-62

036 1975 Nonlinear lateral oscillation in a harbour model
Proc.Symp.on Modelling Techniques,ASCE,pp.836-853

037 1975 On transformation of tsunami inundating into Osaka Bay
Bull.DPRI,Kyoto Univ.,vol.25,pt.4,No.232,pp.37-53

038 1976 紀伊水道を通過する津波の変形について
第 23 回海岸工学講演会論文集,pp.454-458

039 1976 An experimental study on transformation and run-up of long period waves on a gentle slope of a beach
Bull.DPRI,Kyoto Univ.,vol.26,pt.4,No.243,pp.195-211

040 1976 線形解としてみたエッジ波
La mer,Tome 14,No.1,pp.1-6

041 1976 外力の作用による線形エッジ波
La mer, Tome 14,Nos.3-4,pp.139-143

042 1977 湾モデルにおける長周期波の湾口特性について
J.Oceanogr.Soc.Japan,vol.33,No.1,pp.47-53

043 1977 1976 年 8 月のミンダナオ島南部の地震と津波について
東南アジアの研究,vol.15,No.1,pp.95-109

044 1977 音波モデルによる波浪遮蔽模型実験について
第 24 回海岸工学講演会論文集,pp.226-229

045 1977 台風 7617 号による鏡川下流部の流量,水位と潮位との関係
京大防災研究所年報,第 20 号 B,pp.475-482

046 1977 A new optical device for measuring watrer level
Proc.7th Congr.IAHR,vol.6,S-3.4,pp.596-599

047 1977 On diffusive property of particle tracer with the reference to an effect of a jetty
Proc.Coastal Sediment'77,ASCE,pp.417-424

048 1977 On acoustic analogy for oscillations in harbours and bays
La mer, Tome 15,No.3,pp.107-115

049 1978 On transformation of tsunamis in a coastal zone
Marine Tech.Soc.J.,vol.12,No.1,pp.22-25

050 1978 Concept of tsunami economics
Proc.Symp.Tsunami(Ensenada, Baja California,Mexico),Manuscript Report Ser. No.48,pp.236-238

051 1978 An experiment on shoaling and run-up of long waves on a gently sloping beach in a small water basin
Proc.Symp.Tsunamis(Ensenada),Manuscript Report Ser.48,pp.255-257

052 1978 A concept of tsunami economics
Marine Geodesy,vol.1,No.4,pp.361-373

053 1978 On statistical tsunami risk of the Philippines
Southeast Asian Studies,vol.15,No.4,pp.581-590

054 1978 An experiment of nonlinear lateral oscillation in harbor model
Proc.16th Congr.IAHR,vol.1,pp.173-178

055 1978 Beach processes of Shirarahama “a pocket beach”
Bull.DPRI,KyotoUniv.,vol.28,pt.2,No.256,pp.33-68(Tuchiya,Kawata,Shibano, Yamashita,Yoshioka,Serizawa,Kardana：co-author)

056 1979 円弧状海岸の線形波について
La mer, Tome 17,No.1,pp.28-32

057 1979 On statistics of tsunamis in Indonesia
Southeast Asian Studies,vol.16,No.4,pp.664-674

058 1979 A note on the Indonesian earthquake and tsunami of 19 august 1977
Southeast Asian Studies,vol.17,No.1,pp.157-162

059 1979 数値モデルによる大阪湾の湾水振動
第 26 回海岸工学講演会論文集,pp.139-142

060 1980 A note on statistics of historical tsunamis in South East Asia
Proc.Int.Conf.on Eng.for Protection from Natural Disasters,Bangkok,pp.883-894

061 1980 A note on modes of oscillation induced in a Osaka Bay model
Proc.Int.Conf.on Water Resources Development,Taipei,pp.835-843

062 1980 インドネシアの海岸,河川域利用計画
東南アジア研究,vol.18,No.1,pp.154-161(A.R.Syamsudin：co-author)

063 1980 大阪湾の固有振動と高潮,津波との関係(1)
La mer, Tome 18,No.2,pp.69-75

064 1980 大阪湾の固有振動と高潮,津波との関係(2)
La mer, Tome 18,No.2,pp.76-81

065 1980 大阪湾の固有振動と高潮,津波との関係(3)
La mer, Tome 18,No.4,pp.179-183

066 1980 Lowest mode of oscillations in a narrow-mouthed bay
Marine Geodesy,vol.4,No.3,pp.197-222

067 1981 On factors magnifying a storm surge
Proc.19th Congr.IAHR,B(a),paper No.5,New Delhi,pp.47-54

068 1981　楕円弧海岸における長周期波とその安定性

La mer, Tome 19,No.1,pp.1-5

069 1981　数値実験から見た 1977 スンバワ津波

La mer, Tome 19,No.2,pp.30-37

070 1981　大阪湾,紀伊水道の津波の数値モデル

La mer, Tome 19,No.3,pp.105-110

071 1981　西オーストラリア海岸の長周期波について

第 28 回海岸工学講演会論文集,pp.44-48

072 1981　On local probability of invasive tsunami

Marine Geodesy,vol.5,No.3,pp.265-275

073 1981　台風 7916 号による大阪湾,紀伊水道の高潮

京大防災研究所年報,第 24 号 B,pp.475-484

074 1982　数値実験から観た 1883 のクラカトア津波

La mer,Tome 20,No.1,pp.29-36

075 1982　白浜海洋観測塔周辺の水位変動

La mer, Tome 20,No.4,pp.223-230

076 1983　最大波高の超過確率

La mer, Tome 21,No.1,pp.1-6

077 1983　周参見の棚静振

La mer, Tome 21,No.2,pp.89-94(芹沢重厚共著)

078 1983　海岸付近における波の防災科学的研究[日仏海洋学会賞受賞記念]

La mer, Tome 21,No.3,pp.180-182

079 1983　Numerical tsunami model in Osaka Bay

Bull.DPRI,Kyoto Univ,vol.3,pt.1,No.295,pp.1-14

080 1984　津波の古記録とその意義について

La mer, Tome 22,No.2,pp.69-72

081 1984　Tidal torrent control at the entrance of a harbor

Proc.4th Congr.IAHR Asian and Pacific Div.,Chang Mai,pp.567-578

082 1984　日本海中部地震津波に見られる非線形力学

月刊　海洋科学,vol.16,No.9,pp.510-515

083 1984　田辺,白浜における津波について

京大防災研究所年報,第 27 号 B-2,pp.591-610

084 1984　田辺湾で観測された台風時の流れ

La mer, Tome 22,No.4,pp.124-130(芹沢共著)

085 1984　周参見の棚静振(2)

La mer, Tome 22,No.1,pp.1-7

086 1984 A numerical tracking of the 1883 Krakatoa tsunami
Sci.Tsunami Hazards(Int.J.Tsunami Soc.),vol.2,No.1,pp.41-54

087 1984 日本海中部地震津波による災害について
京大防災研究所年報,第 27 号 A,pp.29(土屋義人,酒井哲郎,河竹恵昭,芝野照雄,吉岡洋,山下隆男,島田富美男共著)

088 1984 Opisanie prostranstvenno-bremennoi strukturi spectra tsunami v poberezhnoi zone
Trudi DBNII,bipusk 103, pp.60-71

089 1984 Nainizschaya moda korebani b zalibe d uzkim gorlom
Trudi DBNII,bipusk 103,pp.71-84(H.Loomis：co-author)

090 1984 Binuzdenie kolebaniya b modeli zariba Osaka
Trudi DBNII,bipusk 103,pp.86-92

091 1985 大阪湾の津波
航海(日本航海学会誌),No.83,pp.43-48

092 1985 和歌山県日高川の津浪資料について
La mer, Tome 23,No.1,pp.26-31

093 1985 弱い非線形陸棚波方程式について
La mer, Tome 23,No.2,pp.49-54

0941985 沖合いの擾乱によって誘起される沿岸水位変動について
La mer, Tome 23,No.3,pp.111-117

095 1985 暴風に対する浅水域流速の応答
La mer, Tome 23,No.4,pp.165-170(芹沢共著)

096 1985 沿岸海域の係留観測における流速計特性の相互比較
沿岸海洋研究ノート,vol.22,No.2,pp.165-175(国司,吉岡,芹沢,市川,森田共著)

097 1986 白浜海洋観測塔沖の潮流観測
京大防災研究所年報,第 29 号 B-2,pp.717-725(西,吉岡,芹沢共著)

098 1986 Estimate of exceedance probability of tsunami occurrence in the Eastern Pacific
Marine Geodesy,vol.10,No.2,pp.195-209

099 1986 日本南岸の黒潮流域付近における海洋音速場について
La mer, Tome 24,No.1,pp.42-47

100 1986 巨大津波の前駆異常音について
La mer, Tome 24,No.1,pp.48-52

101 1986 能代沖の海洋音速場と 1983 年日本海中部地震津波
La mer, Tome 24,No.3,pp.186-192

102 1986 水中音の減衰
La mer, Tome 24,No.4,pp.198-201

103 1986 Tsunami threat evaluation by historical documents,numerical model and stochastic model
Proc.Coastal Eng.'86,ASCE,pp.2620-2630

104 1987 白浜海洋観測塔周辺沿岸海域に対する台風 8506 号の影響
京大防災研究所年報,第 30 号 B-2,pp.695-710(芹沢共著)

105 1987 A note on numerical evaluation of tsunami threats by simple hydrodynamic and stochastic models referring to historical descriptions
Bull.DPRI,Kyoto Univ.,vol.37,pt.1,No.322,pp.1-18

106 1987 A numerical prediction of semidiurnal current patterns in Tanabe Bay
Bull.DPRI,Kyoto Univ.,vol.37,pt.3,No.326,pp.91-105

107 1987 Possible subsurface source of an acoustic tsunami precursor
J.Oceanogr.Soc.Japan,vol.43,pp.228-236

108 1987 A response of wide-open bay ina numerical model
Marine Geodesy,vol.11,pp.241-250

109 1987 田辺湾における 3 月暴風通過時の風成波の時間的変化
La mer, Tome 25,No.1,pp.24-30

110 1987 太平洋北西沿岸の三陸津波の前駆異常音について
La mer, Tome 25,No.1,pp.31-35

111 1987 海洋観測塔で記録された遠隔台風による突発的強風
La mer, Tome 25,No.2,pp.62-66

112 1987 古典的海洋観測から見た海洋トモグラフイについて
La mer, Tome 25,No.2,pp.85-89

113 1987 和歌山沿岸の最大津波溯上高について
La mer, Tome 25,No.3,pp.147-150

114 1987 北太平洋西部の印南沿岸(和歌山県)における津波
La mer, Tome 25,No.4,pp.190-192

115 1987 Preparedness for tsunami hazards in Southeast Asia
Proc.Seminar-Workshop on Preparedness for Geologic Disasters in Southeast Asia and the Pacific,NCGS,Makati,Philippines(1-13 Dec.1984),pp.168-176

116 1987 和歌山の歴史津波
月刊　地球,vol.9,No.4,pp.220-224

117 1988 近畿圏沿岸の高潮災害の要因としての黒潮について
京大防災研究所年報,第 31 号 B-2,pp.753-773

118 1988 インドネシア沖の地震による津波前駆音の推定と応用について
東南アジア研究,26 号,1 号,pp.74-85

119 1988 巨大津波の空中前駆音のモデル

La mer, Tome 26,No.2,pp.120-126

120 1988 北山峡のおう穴について

La mer, Tome 26,No.1,pp.47-49

121 1988 紀伊半島沿岸における年周潮 Sa のスペクトルとそのサイドローブ

La mer, Tome 26,No.2,pp.76-80

122 1988 太平洋北西部における 1837 年チリ津波

La mer, Tome 26,No.2,pp.81-85

123 1988 1854 年大津波波源域至近距離の下田原浦で死者ゼロ

La mer, Tome 26,No.4,pp.164-169

124 1988 重力場における対流,カオス,乱流について

La mer, Tome 26,No.4,pp.170-172

125 1988 On audible tsunami on the coast

Sci.of Tsunami Hazards(Int.J.Tsunami Soc.),vol.6,No.1,pp.5-10

126 1988 An observation of factors related to typhoon

Proc.6th IAHR Cong.Asian and Pacific Regional Div.,Kyoto(20-22 july 1988), vol.4, pp.273-280

127 1989 白浜海洋観測塔とその周辺の海象変動について

京大防災研究所年報,第 32 号 B-2,pp.881-890

128 1989 検潮井による検潮記録

La mer, Tome 27,No.1,pp.9-14

129 1989 1707 宝永津波のため山内村全村流亡

La mer, Tome 27,No.2,pp.72-75

130 1989 人工衛星による高度計測と海洋潮汐

La mer, Tome 27,No.4,pp.200-204

131 1989 Reliabikity of tsunami recordings from tidal wells

Marinr Geodesy,vol.13,pp.147-158

132 1989 A tsunami model of Kelvin wave type

Marine Geodesy,vol.13,pp.341-346

133 1990 強制ケルビン波型台風高潮のモデル

京大防災研究所年報,第 33 号 B-2,pp.543-557

134 1990 日本列島周辺の台風高潮パターン 2 例

La mer, Tome 28,No.1,pp.58-62

135 1990 ストックホルムの年平均海水位と北海道知床半島の樹木の年輪

La mer, Tome 28,No.3,pp.146-150

136 1990 Satellite monitoring of storm runoff

Proc.5th Int.Conf.Urban Storm Drainage,Suita(23-27 July 1990),vol.2,pp.639-644

137 1990 A notice on Chilean tsunamis in the northwestern Pacific
Proc.4th Pacific Cong.on Marine Sci.and Tech.(PACON),vol.1,pp.135-140

138 1990 Secular upheaval of datum level in relation to tsunamigenic earthquake
Marine Geodesy,vol.14,pp.137-141

139 1991 陸棚沿岸における台風高潮について
京大防災研究所年報,第 34 号 B-2,pp.471-482

140 1991 On observed waters modified by thermohaline effects in a wide-open estuarine bay
Environmental Hydraulics(eds.by Lee and Cheung),pp.943-948、

141 1991 極潮汐の周期に関連した海水位変動
La mer, Tome 29,No.2,pp.97-102

142 1991 南日本の基本水準面変化から見た古代,中世の津浪史料の評価
La mer, Tome 29,No.3,pp.108-112

143 1992 陸棚沿岸域における台風高潮について
京大防災研究所年報,第 35 号 B-2,pp.215-230

144 1992 紀伊水道東部由良港の水位変動について
海と空,第 68 巻,第 3 号,pp.27-36

145 1992 海洋観測塔で記録された遠隔台風による海上小規模渦
La mer, Tome 30,No.1,pp.38-42

146 1992 大阪湾周辺における 1985 年チリ津波
La mer, Tome 30,No.1,pp.33-37

147 1992 An analysis of the 1985 Chilean tsunami
Marine Geodesy,vol.15,pp.277-281

148 1992 Satellite thermal variations of Kroshio in relation to storm floods
Proc.Pacific Oceanic Remote Sensing and Eng.(PORSEC)Conf.'92,Okinawa, pp.835-840

149 1992 1985 年チリ津波の諸問題
月刊 海洋,vol.24,No.3,pp.147-152

150 1993 Satellite thermal monitoring of storm flood spreading around Kuroshio flow
Bull.DPRI,Kyoto Univ.,vol.43,pt.1,No.373,pp.31-39

151 1993 1852 年モルッカ津波について
東南アジア研究,31 巻,1 号,pp.18-24

152 1993 Transoceanic tsunamis observed in 1985
Sci.Tsunami Hazards(Int.J.Tsunami Soc.),vol.11,No.1,pp.3-6

153 1993 Satellite monitoring of storm flood spread as a land-ocean interaction
IEEE Proc.Int.Geosci.Remote Sensing Symp.,vol.1,Tokyo,pp.203-205

154 1993 Historial tsunamis in relation to public works in Wakayama
Proc.IUGG/IOC Int.Tsunami Symp.,pp.435-457
155 1993 Upheaval at tsunamigenic earthquakes in the Northwestern Pacific
Marine Geodesy,vol.16,pp.253-258
156 1993 Synoptic air-sea interaction for rainfall during a typhoon
Proc.25th Cong.IAHR,Tokyo,vol.1,pp.119-126
157 1993 Multiple resonant modes of waters in a wide-open bay
Recent Advances in Marine Sci.and Tech'92(ed. N.K.saxena),PACON Int., pp.115-125
158 1993 周参見浦の津波史料について
La mer, Tome 31,No.1,pp.37-39
159 1994 Qhat a hazardous impact was at Aonae Harbor in July 1993
AGU-WPGM,Hong Kong,July 1994,EOS Supplment,p.67
160 1994 人工衛星電波信号前方散乱を利用した有義波連続観測法
La mer, Tome 32,No.1,pp.51-56
161 1994 黒潮流軸周辺の渦度フロント
La mer, Tome 32,No.2,pp.123-130
162 1994 奥尻島青苗岬周辺の津波について
La mer, Tome 32,No.2,pp.131-135
163 1994 雨台風による高潮について
La mer, Tome 32,pp.169-173
164 1994 陸棚沿岸の高潮－理論と実態－(書籍)
近代文芸社刊,東京,176p.
165 1994 Annual mean sea level variations in the Northwestern Pacific zone
Marine Geodesy,vol.17,No.3,pp.213-218
166 1994 Classification of the explored techniques for detecting offshore waves
HYDRO-PORT'94(Int.Conf.on Hydrotechnical Engineering for Port and Harbor Construction,Oct.19-21 1994,Yokosuka),vol.1,pp.187-202
167 1994 Annual mean sea level and tsunamigenic earthquake in the northwestern Pacific
Proc.INSMAP'94(Int.Symp.on Marine Positioning),pp.577-584
168 1994 黒潮フロントに対する水平シアー流の効果
京大防災研究所年報,No.37B-2,pp.661-667
169 1995 Oceanic thermal variations during the 1995 Hyogo South Earthquake
DPRI Newsletter,Kyoto Univ.,Special Issue(Feb.1995),pp.45-46
170 1995 沖合いの観測塔による冬の海象観測
La mer, Tome 33,No.2,pp.103-106

171 1995 台風によるうねりと海岸構造物の損傷

La mer, Tome 33,No.2,pp.125-127

172 1995 白浜海洋観測塔とその周辺の海象長期変動

京大防災研究所年報,No.37B-2,pp.657-660(芹沢共著)

173 1995 黒潮フロントの蛇行について

京大防災研究所年報,No.38B-2,pp.645-654

174 1995 Oceanic subsurface thermal variations during the 1995 Hyogo South Earthquake

Sci.Tsunami Hazards(Int.J.Tsunami Soc.),vol.13,No.1,pp.53-56

175 1995 海面状態による衛星画像上にみられる見かけの海面水温上昇

La mer, Tome 33,No.4,pp.125-127

2010 April 01

Autobiography and Curriculum Vitae

Name: **Shigehisa Nakamura, Mr..**
Birth: 1933/ Nagasaki, Japan
Address: Famille Vila-A104, Minato, Tanabe, Wakayama, 646-0031 Japan
Tel/Fax: +81-739-25-5691
Email address: schnak09@power.odn.ne.jp

Education

1958 Batchelor of Science, Faculty of Science(Geophysics-Geoelectromagnetism), Kyoto University, Japan
1960 Master of Science, School of Geophysics(Physical Oceanography), Kyoto University, Japan
1963 Finished Doctor Course, School of Geophysics(Physical Oceanography), Kyoto University, Japan [Candidate of PhD as Doctor of Science]
1976 Doctor of Engineering-Civil and Ocean Engineering(PhD), Kyoto University

Affiliation

1963-1997- Disaster Prevention Research Institute, Kyoto University, Japan
1978 - Visiting Senior Fellow, Hawaii University at Manoa, Honolulu, HI, USA
1980-1981- Visiting scientist, CSIRO at Perth, Western Australia, Australia
1992-1996- Director, Shirahama Oceanographic Observatory, Kyoto University

1988-Life Member, American Geophysical Union, Washington, USA
1992- Fellow, Royal meteorological Society, UK
2004- Fellow, PACON International (Univ.Hawaii), Honolulu, Hawaii, USA
2007- Fellow, Electromagnetics Academy (MIT), Cambridge, Massachusetts, USA
2008-Gratis Member, European Geosciences Union

Prize and Honours:

1983- Prix de la Franco-Japonaise Societe de Oceanographie, Tokyo, Japan

Published materials: Academic papers in Scientific Journals, Proceedings, and others
Scientific Books(Japanese and/English) including "e-Books"
[search Nakamura in the Web-sites, ->>http:www.piers.org
and/or ->>http://repository.kulib.kyoto-u.ac.jp/dspace]

Recent Interests: Satellite monitoring for earth science, Electromagnetism,
Ocean Sciences, Radiations, Natural Hazards, Civil Engineering

I, as Shigehisa Nakamura, declare that my curriculum vitae are correct as seen above.

Shigehisa Nakamura

INTERNATIONAL ACTIVITY – Shigehisa Nakamura 2010Apr01

1. 71Aug01-71Aug19 IUGG General Assembly, Moscow, USSR
2. 72Aprx1-72Aprx2/a Congress on Ocean Development,Keidanren,Tokyo#
3. 74Jan25-74Feb03 IUGG Tsunami Symposium, Wellington, NZ
4. 77Mar21-77Apr01 IUGG Tsunami Symposium Ensenada, Mexico
5. 78Jun10-78Oct10 *Visiting Senior Fellow, Hawaii Univ., HIG, Hon, HI
6. 79Aug24-79Sep05 Pacific Science Congress, Khabarovsk, USSR
7. 80Jul26-81Jan21 *Visiting Scientist, CSIRO Perth(Div.LRM), Australia
8. 82Aug15-82Aug22 Tsunami Soc., Honolulu, Hawaii, USA
9. 83Aug13-83Aug28 IUGG General Asembly, Hamburg, West Germany
10. 84Dec09-84Dec15 Seminar/Workshop on Preparedness for Geologic Disasters in Southeast Asia and the Pacific Region, Manila, Philippines
11. 85Aug03-85Aug09 Joint Assembly IAMAP/IAPSO, Honolulu, HI, USA
12. 87Aug16-87Aug24 IUGG General Assembly, Vancouver, Canada
13. 88Mar18-88Mar25 EuropeanGeopysicalSociety(EGS) General Assembly, Bologna, Italy
14. 88Nov14-88Nov21 NOAA Int.Conf.on Tidal Hydrodynamics(NBS/NIST) Gaithersburg, MD, USA
15. 91Aug17-91Aug24 IUGG General Assembly, Wien, Austria
16. 91Sep20-91Oct05 Int.Workshop ‘Waves and Vortices in the Ocean and their Laboratory Analogues, Vladibostok, Russia
17. 92Apr06-92Apr10 EGS General Assembly, Edinburg, UK
18. 92Jun01-92-Jun05 Pacific Congress on Marine Science and Technology, (PACON), Kona, Hawaii, USA
19. 93Jun13-93Jun18 PACON93 China Symposium, Beijing, China
20. 94Jul02-94Jul09 PACON94, Townsville, Queensland, Australia
21. 94Sep20-94Sep27 InternationalSymposium on Marine Positioning 1994 (INSMAP94), Hannover, Germany
22. 95Apr02-95Apr09 EGS General Assembly, Hamburg, Germany
23. 95Jun05-95Jun10 Int.Workshop ‘Boundary Effects in Stratified and/or Rotating Fluids’, Sankt-Peterburg(Pushkin-Tsarskoi Selo), Russia
24. 95Aug09-95Aug14 IAPSO(IUGG) General Assembly, Hon, HI, USA
25. 96Mar04-96Mar10 Oceanology International 96, Brighton, UK
26. 96Jun17-96Jun23 PACON96, Honolulu, Hawaii, USA
27. 96Jul20-96Jul26 AGU-WPGM’96, Brisbane, Australia

28.96Aug12-96Aug18 Pacific Ocean Remote Sensing Conf.(PORSEC96), Victoria, BC, Canada
29.97May10-97May14 Oceanology International 97 Pacific Rim, Singapore
30.97Jun30-97Jul04 Joint Assembly IAMAS/IAPSO, Melbourn, Australia
31.98Jul21-98Jul24 AGU-WPGM'98, Taipei, Taiwan
32.98Jul27-98Jul31 PORSEC98, Quindao, China
33.98Oct12-98Oct15 ICHD98, Seoul, Korea
34.99Mar22-99Mar26 PIERS1999, Taipei, Taiwan
35.99Jul19-99Jul24 IUGG99 General Assembly, Birmingham, UK
36.00Mar25-00Apr01 ISRE(Int.Sym.Remote Sensing Env.), Cape Town, SA
37.00Dec03-00Dec08 PORSEC2000, Panaji, Goa, India
38.01Jul08-01Jul12 PACON2001(Jul8-11), Burlingame, Calif., USA
39.01Jul15-01Jul19 IAMAS2001(Jul.10-18), Innsbruck, Austria
40.02Feb11-02Feb15 AGU-Ocean Sciences 2002, Honolulu, Hawaii, USA*
41.02Jul01-02Jul05 PIERS2002, Cambridge, MA, USA
42.02Jul21-02Jul26/b PACON2002, Makuhari, Chiba#
43.03Jun30-03Jul11/c IUGG2003, Sapporo, Hokkaido#
44.03Oct12-03Oct16 PIERS2003, Honolulu, Hawaii, USA
45.03Nov30-03Dec03 PACON2003, Kaoshiung, Taiwan
46.04May30-04Jun04 PACON2004, Honolulu, Hawaii, USA
47.04Aug15-04Aug21 ICTAM2004, Warsaw, Poland*
48.04Aug28-04Aug31 PIERS2004, Nanjing, China
49.05May23-05May27 AGU Joint Assembly, New Orleans, LA, USA*
50.05Aug23-05Aug26 PIERS2005, Hangzhou, China
51.06Mar26-06Mar31 PIERS2006, Cambridge, MA, USA
52.06Jul24-06Jul27 AGU-WPGM, Beijing, China*
53.07Mar26-07Mar30 PIERS2007, Beijing, China
54.07Aug27-08Aug30 PIERS2007, Prague, Czech
55.08Mar24-08Mar28 PIERS2008, Hangzhou, China
56.08Apr13-08Apr18 EGU2008 General Assembly, Vienna, Austria
57.09Mar23-09Mar27 PIERS2009, Beijing, China
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Brief Note to the Author

Name- Shigehisa Nakamura
(born-Nagasaki, 1933)
Affiliation-- Kyoto University (Retired)
Field of Jobs- Geophysics, Electromagnetics, Civil Engineers
Memberships- Life Member, Amercan Geophysical Union, USA
Fellow, Royal meteorological Society, UK
Fellow, PACON International, (University of Hawaii), USA
Gratis Member, European Geo-Science Union, EU